THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. CVIII. No. 2428.] LONDON, NOVEMBER 23, 1909. [61ST YEAR. PRICE 6d.

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FOR SHUTTING OFF GAS IN MAINS TEMPORARILY DURING ALTERATIONS AND REPAIRS.

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With all Latest Improvements.

SHORT'S IMPROVED AND ANSELL CLOCK FORM.

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For Purifier Blow-off Valves.

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For Hard Usage.

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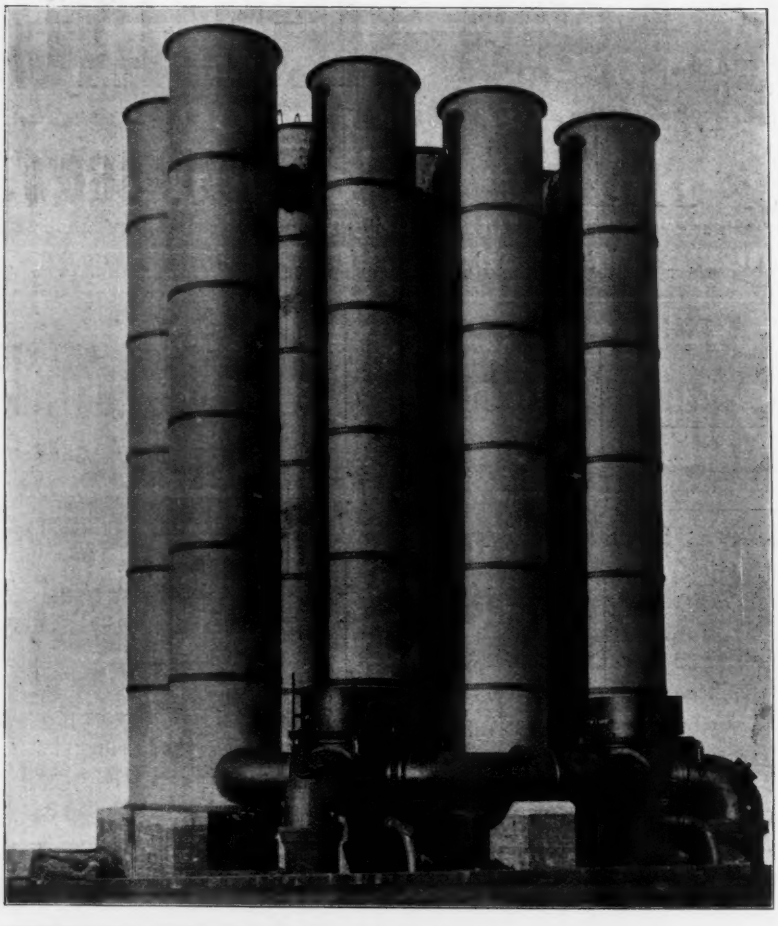

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INVERTED BURNER

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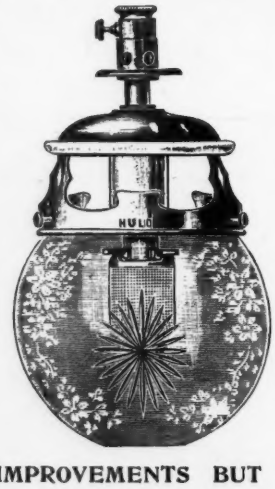

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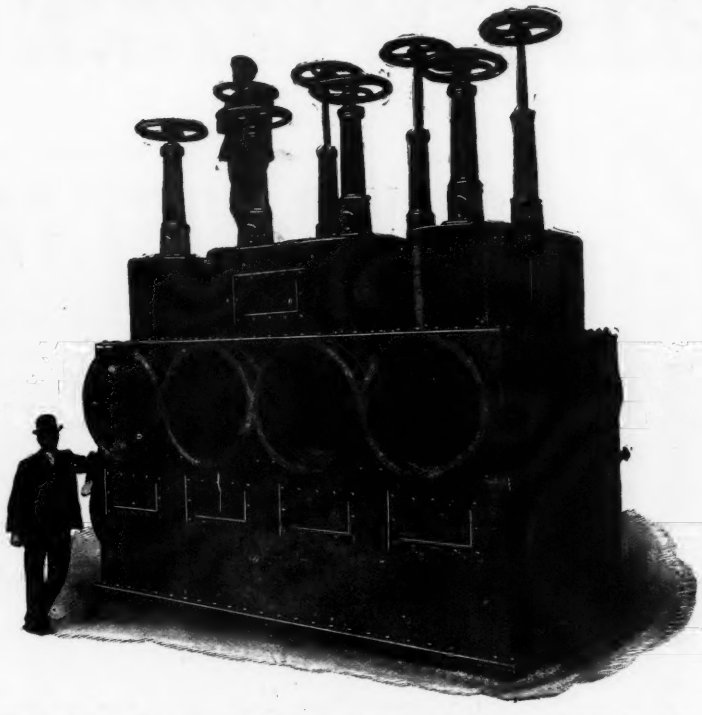

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ENSURES ABSOLUTE SECURITY AGAINST THEFT.

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Extracts from Tests made by

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DURHAM (THORNLEY) COAL.

Gas made per Ton	13,102	cubic feet.
Fuel Consumption	12·3	lbs. per cent.
Illuminating Power	15·56	No. 2 Met. Burner.
Calorific Value	573·6	B.Th.U. (Gross).

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Gas made per Ton	12,435	cubic feet.
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Illuminating Power	16·19	No. 2 Met. Burner.
Calorific Value	584·9	B.Th.U. (Gross).

LANCASHIRE, WIGAN (ARLEY MINE).

Gas made per Ton	12,145	cubic feet.
Fuel Consumption	12·2	lbs. per cent.
Illuminating Power	15·22	No. 2 Met. Burner.
Calorific Value	576·2	B.Th.U. (Gross).

See "JOURNAL OF GAS LIGHTING," June 8 & July 20, 1909, for description and results.

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Reduced to

POPULAR PRICES.

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Gives a Splendid Light.

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High Efficiency.
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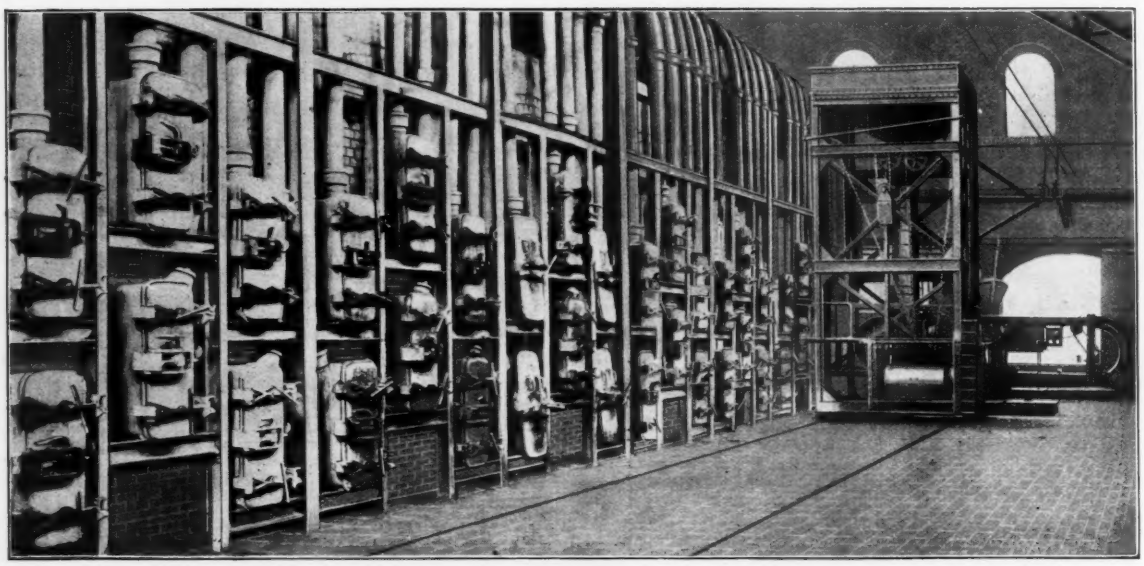
NORWICH CHAMBER

RETORT SETTINGS.



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21 CWT. CHARGES or larger if required.

GAS RESULTS, **13,600** cub. ft. of **14·5** c.p. gas per Ton of coal carbonized.

COKE, **GREY, DENSE,** and **MASSIVE,** suitable for many metallurgical purposes and for malting.

OPERATING COSTS considerably lowered owing to greatly reduced number of operations.

ADAPTABLE TO EXISTING REGENERATORS.

The work of **CHARGING AND DISCHARGING** these Chamber Retorts is performed by the **"D.B." STOKING MACHINES** with the same **SMOOTHNESS** and **RELIABILITY** that characterizes the working of the **"D.B. MACHINES"** with ordinary Retorts.

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Entire Gas-Works & Coke Oven Plants,

Retort Furnaces,

Furnaces for Chamber Settings (*Patent*), New Coke Ovens (*Patent*),

With and without Recovery of the Bye-Products, Tar and Benzol Distilleries, Ammonia Works, and Cyanogen Extraction Plants.

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LUCAS LIGHT'S LONG LIFE

is proof of this.

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The Lucas Light was the first and original self-intensive high-power lamp, and **its steady sale to-day proves its value.**

200, 400, and 700-candle power from a single mantle, with gas at its usual pressure, and with the lowest consumption on record.

No high pressure required.

SIMPLE. BRILLIANT. RELIABLE.

The "Lucas" is the best lamp for Public Halls, Factories, Workshops, Streets, Railway Stations, &c., and the prices compare favourably with those of any similar type of lamp.

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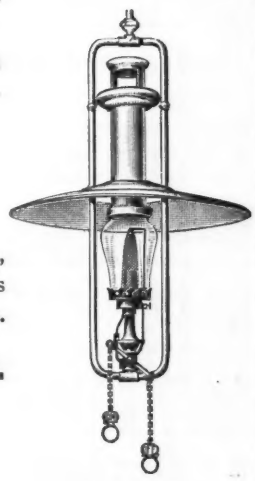

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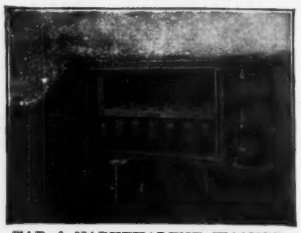

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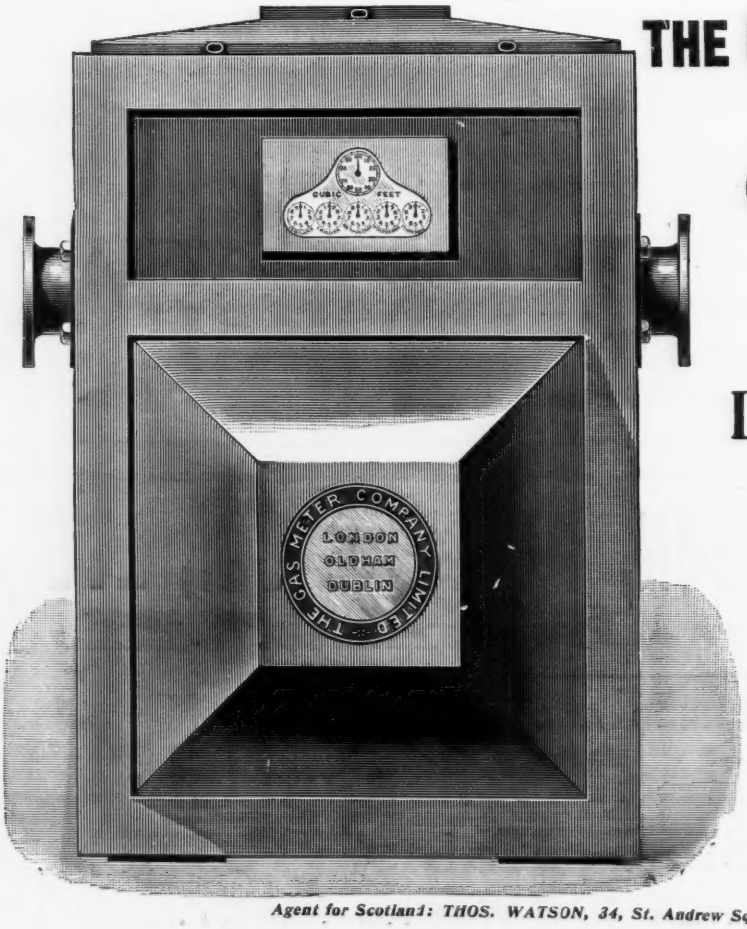
SPECIALITIES { Hydrated Oxide of Iron for Gas Purification, and of different Strengths to suit conditions of Purification, Sulphuric Acid (free from Arsenic) for Sulphate of Ammonia Manufacture, Recovered Sulphur, and Prussiates of Soda, Spent Oxide bought on Sulphur and Cyanide Contents, Tar and Gas Liquor purchased. *See our Advertisement last week.*



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CROLL'S PATENT IMPROVED DRY GAS-METERS.

ALL SIZES IN STOCK.

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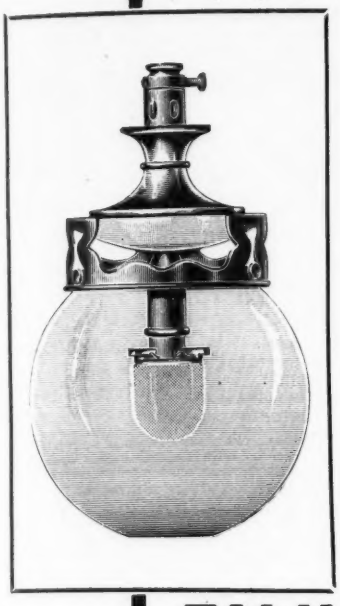

British Manufacture.

55 Candles for a consumption of **2¼** Cubic Feet of Gas per Hour.

NEW INTERMEDIATE SIZE.

Specially suited for **domestic lighting,** having a **small gas consumption,** combined with a **good illuminating power** and **neat appearance.**

Fitted with **china deflector, mixing chamber, superior gas regulator,** with thumbscrew of non-heating material, and **air regulator.**

Takes medium size Mantles and Glassware.

May we send you a Sample?

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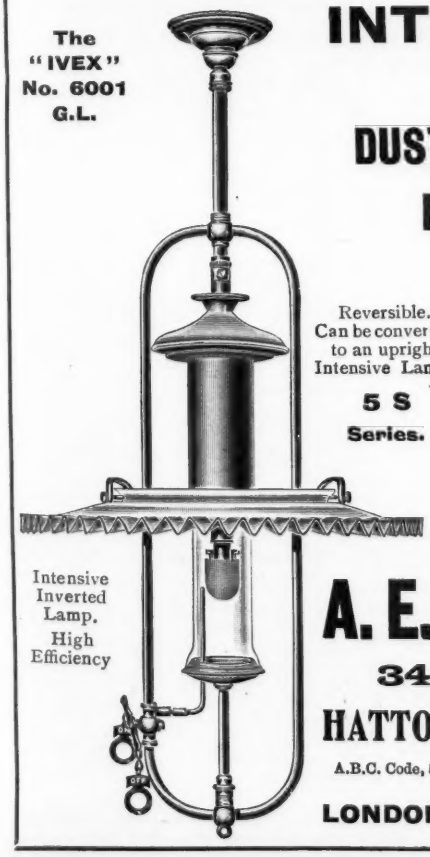
LONDON, 83, 85, and 87, Farringdon Road, E.C. **&** **GLASGOW,** 74, 76, and 78, Great Clyde Street.

PODMORE'S PATENT SELF-INTENSIVE INTERIOR LAMPS.

The "IVEX" No. 6001 G.L.



Intensive Inverted Lamp. High Efficiency

Reversible. Can be converted to an upright Intensive Lamp.

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DUST AND INSECT PROOF BUNSEN BURNERS.

6 A Series.

Suitable for all Trades.

Especially suitable for India and the Colonies.

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Agram, Croatia	200,000	Flensburg, Sleswig	300,000	Port Elizabeth, S.A	400,000
Alkmaar, Holland	400,000	Forst, Brandenburg	300,000	Portsmouth	1,000,000
Allenstein, Germany	200,000	Frankenthal, Germany	175,000	Posen, Germany	450,000
Antwerp, Belgium	1,500,000	G. L. & C. Co. Beckton	2,250,000	Posen (2nd)	700,000
Antwerp (2nd)	1,000,000	G. L. & C. Co., ,, (2nd)	10,750,000	Prague, Austria	140,000
Ashford	250,000	G. L. & C. Co., Bromley	3,750,000	Preston	1,400,000
Augsburg, Bavaria	425,000	G. L. & C. Co., Fulham	1,750,000	Reading	1,000,000
Aylesbury	150,000	G. L. & C. Co., ,, (2nd)	750,000	Redhill	275,000
Barmen-Rittershausen	500,000	G.L. & C.Co., Kensal Green	2,250,000	Redhill (2nd)	300,000
Barrow	300,000	G. L. & C. Co., Nine Elms	2,750,000	Reichenberg, Bohemia	200,000
Bath	1,000,000	Gablonz, Austria	140,000	Reichenberg (2nd)	200,000
Belfast	1,700,000	Gelsenkirchen, Westphalia	175,000	Revel, Russia	350000
Belfast (2nd)	4,500,000	Gelsenkirchen (2nd)	350,000	Rhymney Valley	175,000
Benrath, Germany	125,000	Geneva, Switz.	500,000	Romford	300,000
Berlin—Charlottenburg	2,500,000	Gosport	200,000	Romford (2nd)	350,000
Berlin—Rixdorf	650,000	Göteborg, Sweden	300,000	Rotterdam, Holland	850,000
Berlin—Rixdorf (2nd)	700,000	Göteborg (2nd)	600,000	Rotterdam (2nd)	1,500,000
Berlin—Tegel	3,500,000	Graudenz, Prussia	200,000	Rotterdam (3rd)	750,000
Berlin—Tegel (2nd)	6,350,000	Guildford	350,000	Rotterdam (4th)	750,000
Bilston	375,000	Guildford (2nd)	200,000	Rotterdam (5th)	600,000
Birmingham	1,500,000	Haarlem, Holland	850,000	St. Albans	700,000
Bishop's Stortford	200,000	Hamburg, Germany	1,750,000	St. Gallen, Switz.	225,000
Bochum, Westphalia	530,000	Hampton Court	500,000	St. Gallen (2nd)	225,000
Bognor	100,000	Hampton Court (2nd)	600,000	St. Joseph, Mo.	750,000
Bordentown, N.J.	125,000	Hartlepool	750,000	San Paulo, Brazil	700,000
Bournemouth	1,000,000	Hebden Bridge	200,000	Santiago de Cuba	400,000
Bournemouth (2nd)	500,000	Heidelberg, Germany	200,000	Scarborough	800,000
Bremen, Germany	550,000	Holyoke, Mass.	600,000	Schwelm, Westphalia	100,000
Bremen (2nd)	950,000	Hong Kong	450,000	Shanghai	225,000
Bremen (3rd)	850,000	Hull	1,500,000	Shanghai (2nd)	225,000
Brentford	1,200,000	Ilford	650,000	Shanghai (3rd)	1,600,000
Brentford (2nd)	850,000	Innsbruck, Austria	200,000	Southampton	800,000
Bridgwater	200,000	Ipswich	750,000	Southampton (2nd)	500,000
Bridlington	150,000	Kampen, Holland	350,000	Southampton (3rd)	600,000
Bridlington (2nd)	200,000	Kiel, Sleswig	1,000,000	Southgate	400,000
Brieg, Silesia	100,000	Kiel (2nd)	880,000	Southport	750,000
Brighton	1,750,000	L. & N.W. Rly., Crewe	700,000	Southport (2nd)	900,000
Brighton (2nd)	1,850,000	Lausanne, Switz.	250,000	South Shields	650,000
Bromley	1,500,000	Lawrence, Mass.	400,000	Stafford	500,000
Bruges, Belgium	200,000	Lea Bridge	350,000	Staines	600,000
Brussels—Anderlecht	350,000	Lea Bridge (2nd)	350,000	Stettin, Germany	880,000
Brussels—Anderlecht (2nd)	350,000	Lea Bridge (3rd)	400,000	Stockholm	1,500,000
Brussels—Forest	1,000,000	Lea Bridge (4th)	1,000,000	Stockholm (2nd)	1,750,000
Brussels—Koekelberg	1,000,000	Leeuwarden, Holland	400,000	Stockport	600,000
Brussels—St. Gilles	1,000,000	Leiden, Holland	500,000	Stockport (2nd)	600,000
Brussels—St. Josse	1,000,000	Leiden (2nd)	575,000	Stockport (3rd)	400,000
Brussels—St. Josse (2nd)	600,000	Leigh, Lancs.	350,000	Stockton-on-Tees	500,000
Brussels—Ville	750,000	Lemberg, Galicia	260,000	Swansea	750,000
Brussels—Ville (2nd)	750,000	Lemberg (2nd)	500,000	Swansea (2nd)	1,000,000
Brussels—Ville (3rd)	1,500,000	Liége, Belgium	1,000,000	Swansea (3rd)	450,000
Brussels—Ville (4th)	350,000	Liége (2nd)	750,000	Swindon	300,000
Bucarest, Roumania	1,100,000	Lincoln	500,000	Sydney—Harbour	500,000
Budapest, Hungary	50,000	Liverpool	3,500,000	Sydney—Harbour (2nd)	500,000
Budapest (2nd)	1,750,000	Liverpool (2nd)	4,500,000	Sydney—Mortlake	500,000
Carlisle	600,000	Longton	600,000	Sydney—Mortlake (2nd)	500,000
Carlsruhe, Germany	500,000	Louvain, Belgium	800,000	Syracuse, N.Y.	850,000
Chigwell	350,000	Lübeck, Germany	400,000	Taunton	225,000
Chorley	300,000	Maastricht, Holland	200,000	Taunton (2nd)	350,000
Commercial, London	850,000	Magdeburg, Germany	1,400,000	The Hague Holland	1,000,000
Commercial (2nd)	850,000	Maidenhead	225,000	The Hague (2nd)	500,000
Commercial (3rd)	1,250,000	Maidenhead (2nd)	225,000	Tilburg, Holland	400,000
Commercial (4th)	2,000,000	Maidstone	500,000	Torquay	350,000
Copenhagen	700,000	Malines, Belgium	500,000	Tottenham	750,000
Copenhagen (2nd)	2,500,000	Malmö, Sweden	350,000	Tottenham (2nd)	750,000
Courtrai, Belgium	250,000	Malta	400,000	Tottenham (3rd)	350,000
Coventry	600,000	Manchester	3,500,000	Tottenham (4th)	1,000,000
Coventry (2nd)	600,000	Manchester (2nd)	3,500,000	Tottenham (5th)	1,000,000
Cracow, Galicia	200,000	Marlborough	100,000	Tottenham (6th)	1,250,000
Cracow (2nd)	200,000	Mayence, Germany	700,000	Tunbridge Wells	1,000,000
Crefeld, Germany	500,000	McKeesport, Pa.	500,000	Utrecht, Holland	1,000,000
Croydon	1,250,000	Merthyr Tydfil	300,000	Utrecht (2nd)	1,000,000
Croydon (2nd)	625,000	Middlesbrough	1,250,000	Verviers, Belgium	1,000,000
Croydon (3rd)	625,000	Namur, Belgium	175,000	Vienna	3,500,000
Croydon (4th)	550,000	Nelson	400,000	Vienna (2nd)	2,500,000
Debreczin, Hungary	100,000	Newburgh, N.Y.	600,000	Waltham	400,000
Deventer, Holland	150,000	New York	5,200,000	Wandsworth & Putney	1,800,000
Deventer (2nd)	200,000	Nictheroy, Brazil	250,000	Watford	300,000
Dorking	150,000	North Middlesex	150,000	Watford (2nd)	350,000
Dublin	2,000,000	North Middlesex (2nd)	200,000	Wellington, N.Z.	350,000
Dublin (2nd)	2,000,000	North Middlesex (3rd)	75,000	West Bromwich	550,000
Dublin (3rd)	650,000	Norwich	1,000,000	West Ham	1,500,000
Dundee	1,500,000	Norwich (2nd)	300,000	West Ham (2nd)	800,000
Dunedin, N.Z.	150,000	Norwich (3rd)	500,000	Weston-super-Mare	350,000
Dunedin, N.Z. (2nd)	275,000	Nottingham	1,000,000	Weston (2nd)	350,000
Durham	200,000	Nottingham (2nd)	1,000,000	Wexford, Ireland	100,000
Düsseldorf, Germany	1,000,000	Nuneaton	125,000	Wiesbaden, Germany	850,000
Eastbourne	1,250,000	Oberhausen, Germany	175,000	Winchester	225,000
Edinburgh	2,000,000	Oldenburg, Germany	200,000	Winchester (2nd)	125,000
Epsom	225,000	Ostend, Belgium	100,000	Wolverhampton	1,500,000
Epsom (2nd)	300,000	Ostend (2nd)	200,000	Zwolle, Holland	200,000
Falmouth	150,000	Perth, W.A.	125,000	Zwolle (2nd)	200,000

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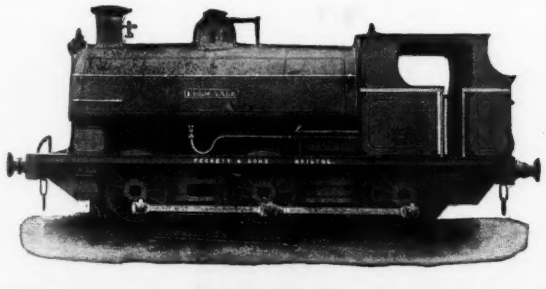

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EDITORIAL NOTES—GAS, &c.

Depreciation Allowance for Income-Tax.

AN important letter which throws light upon the peculiar position taken up by the Somerset House authorities in relation to the allowance of depreciation upon gas plant and appliances in assessing for income-tax appears in our "Correspondence" columns. The letter was addressed to the Gas Companies' Protection Association by Mr. William Cash, F.C.A.; and it has been forwarded to us for publication. It sets out the results of communications and interviews that Mr. Cash has had with the authorities at Somerset House, and then gives his own views, as an authority on gas finance, on the points at issue. The investigation has brought to knowledge three points, any one of which would alone be sufficient to question the fairness of the instructions of the Board of Inland Revenue to the Surveyors of Taxes. In the first place, before the issue of the circular to which the gas industry takes strong exception, it appears that the authorities had conferences with representatives of certain statutory undertakings—tramways and electric light undertakings, but not of gas undertakings. In the second place, it is submitted by the department that their aim has been throughout to obtain uniformity in the assessment of these kindred undertakings. In the third place, Mr. Cash has ascertained the principles upon which the department is proceeding in this matter. The investigation places the gas industry in possession of knowledge in connection with this piece of official injustice which they had not previously; and it will, together with the advice tendered by Mr. Cash, strengthen the resistance to the arbitrary instructions to the Surveyors of Taxes.

As to the first point, that the gas industry were unrepresented at the conferences that preceded the issue of the instructions, the industry has here just cause for complaint at being ignored in this fashion. It is not a sufficient excuse for the authorities to say they were unaware of the existence of the Gas Companies' Protection Association, and, presumably, of the Institution of Gas Engineers. It is evident that, notwithstanding the huge interests involved in the gas industry, and the large taxation claims made upon it, the authorities did not condescend to inquire whether there was a representative organization with which they could confer in the same way that they did with the tramway and electrical interests. The regret now expressed does not exonerate them, nor does it rectify the omission, nor compensate for the fact that there has been no proper consideration of the arguments that the gas industry would have been prepared to advance against the instructions laid down for the guidance of the surveyors. Regarding the second point, that it has been the aim of the department throughout to obtain uniformity in the assessment of these kindred undertakings, there is sufficient dissimilarity between the material and trading affairs of gas, electricity, and tramway undertakings for the kindredship to be questioned. However that may be, the inquiry can be put as to whether or not it is a fact that an allowance has been agreed upon in respect of depreciation in connection with electrical undertakings. According to a report presented at the annual meeting of the Incorporated Municipal Electrical Association, there has been such an agreement (see "JOURNAL" for Aug. 10, last paragraph on p. 373). If this report is correct, then the aim of the department has ended in disuniformity, and not uniformity.

Concerning the third point, as to the principles the authorities have arbitrarily laid down as a justification for their procedure in this matter, it is contended that, by allowing for renewals as they take place, gas undertakings receive all the consideration that they are entitled to. This is a principle that is neither reasonable nor sound; and certainly it is one to which the industry will not willingly subscribe. Current charges to revenue for repairs and renewals do not in such a business as gas manufacture and distribution cover the constant depreciation and obsolescence that are going on all around. Why statutory industries should be treated differently from ordinary traders in this matter of depreciation allowance has not been explained; and Mr. Cash sees "no reason why a company should be asked, for income-tax "purposes, to defer the charge against revenue for renewals, "until these actually take place, and to depart from what is "a well-established principle of making an annual allowance "for depreciation as recognized by the Income-Tax Acts, "and allowed to all traders." We particularly quote this expression of opinion, as, though there is no definite suggestion to this effect, we seem to detect in Mr. Cash's letter a hint at an attempted compromise (which has already been rejected by the Somerset House officials) by drawing a distinction between fixed plant—such as buildings, retorts, gasholders, &c.—and short-life plant, such as meters, stoves, and internal house fittings. We see no reason why, in the case of fixed plant of the nature mentioned—the renewal of which means heavy expenditure, and the depreciation of which commences from its advent in service—"a company should be "asked, for income-tax purposes, to defer the charge against "revenue for renewals, until these actually take place," and so "depart from a well-established principle." That Mr. Cash moreover considers it good policy to take Time by the forelock in regard to depreciation is amply clear in other parts of his communication—for example: "Apart from the sub-"ject of income-tax, there can be no question whatever as "to the desirability, and, in fact, necessity, of a gas company "making provision, out of current profits, for depreciation "which is going on continually, and which will have to be "met when the plant in question has to be renewed." Then, again, Mr. Cash does not see why a gas company should not claim, and be allowed, like any other trader, for depreciation on such assets as labour-saving machinery, much of which he describes as of "a quick running type." If on this machinery, why not on retorts, which, under the high-temperature carbonization of the times, is also of a somewhat "quick running type" in another sense. It comes to this, that there must be no compromise, nor any willing acceptance of a principle that is authoritatively pronounced unsound. Any compromise would be the first endorsement of the new principle laid down by the Inland Revenue authorities; and there is no knowing to what it would ultimately lead.

We have only written the foregoing on the assumption that we are correct in thinking that Mr. Cash set out with the view that this is a matter in which some compromise might be effected by drawing a distinction between fixed plant and short-life appliances on the broad question of depreciation allowance and disallowance. Whether or not we are correct in this, on the general question as to the injustice of the instructions of the Inland Revenue authorities, he is absolutely at one with the gas industry, with whose interests, as is well known, he is so closely identified professionally and administratively. But turning to the question of short-life plant—such as stoves, meters, and internal house fittings, the authorities stated that they would be prepared, in assessing renewals, to deal with the question on generous lines, and estimate the renewals on average prices. This, we fear, would tend to a great deal of dispute and variation in practice. The officials would not admit that depreciation could be allowed on this short-life plant, as there was considerable doubt as to whether, so far as stoves and house fittings were concerned, they constituted machinery and plant within the meaning of the Income-Tax Acts. From which it would appear that the Inland Revenue authorities have arrived at a decision on this particular point, despite the existence of "considerable doubt." A rigid resistance to their proposed arrangement is the advice of Mr. Cash. Upon this point and several others, the views expressed in the letter are instructive, and in perfect accord with the general view in, and interests of, the industry. The principles enunciated by the Somerset House authorities must not be allowed to

become established by consent to be inferred by inaction. The contest must be carried to the end, by, where proper allowance is not made, appeal to the Commissioners, and then, if unsuccessful, steps should be taken (as Mr. Cash advises) to have the question determined on a stated case by the High Court. It is clear the Inland Revenue authorities have opened the door widely for contention on a matter involving an important principle; and the position should be met without delay by some concerted action. Of course, it cannot be expected that the Gas Companies' Protection Association can bear the costs of a test case; though (as a letter received late yesterday from the Chairman, Mr. H. E. Jones, on p. 520 shows), they are prepared to do all in their power to advance in various ways a legal pronouncement on the point.

The Sliding-Scale through American Glasses.

It passes strange in this country that America should only now be discussing the *pros* and *cons* of the sliding-scale principle as applied to the sale of gas under company administration, and be dealing with it as something that should be regarded as purely of an experimental nature. Mr. Alfred E. Forstall, in a paper on "The Sliding-Scale Regulation "of Prices and Rates of Dividend for Gas Companies," of which we reproduce the chief portions elsewhere, bestows on American gas administrators a bit of his mind over their perpetual treatment of the gas-supply business as though it were virgin ground upon which it was necessary to be constantly making experiment, rather than accept the large experience of others. The whole history of the rule and regulation applying to American gas supply, has been one of re-exploration of territory already traversed by British gas enterprise. The penalty of independence has been paid; and, as is commonly the case, dearly paid for has been the experience, the conclusions of which have come out very much the same as those of the foregone British experience. Though it was as far back as 1875 that the sliding-scale was first introduced in the Commercial Gas Company's Act, and has since spread its salutary influence throughout the length and breadth of gas supply by statutory companies in the British Isles, it is only within the last five years that America has seriously given it thought. In 1906 particularly was consideration being accorded to it by the Massachusetts Board of Gas and Electric Light Commissioners and the Boston Gas Companies; and then it was Messrs. Stevenson and Burstal made their favourable report to the latter upon its working in this country. But America has not advanced far in the application of a system that imparts a mutual pecuniary interest to consumers and stock or share holders in the economies of working, which economies are greatly assisted by the extent of the consumers' patronage. Mr. Forstall's paper may, however, do something to revive interest in America in what has been found in this country to be one of the most far-reaching regulations—if not the most far-reaching—in beneficial effect that has ever been applied to gas supply.

The author states the case of the sliding-scale fairly and clearly, and shows the mode by which its application could be arranged under American conditions. But he makes one criticism. "The fixing of the extent to which the rate of "dividend on stocks under the sliding-scale shall change "for the unit change in price of gas would seem," he says, "to deserve more careful consideration than has been given "to it in Great Britain." His reason for thinking this is that, under the provision that the rate shall always change one-quarter of 1 per cent. for each change of 1d. in price, the proportion borne by the total amount of extra dividend allowed the stockholders to the saving accruing to the consumers has grown steadily smaller until in some cases it is as low as 1 : 6 and 1 : 7. The result of this, he adds, has been to decrease the incentive to achieve further reductions in price. It is admitted that the proportion going to the proprietors of the total sum divided between them and the consumers has, by the expansion of business—a large part of which represents a sort of "unearned increment" through a natural development of district, industries, and uses of gas—dwindled; but any interference with the fixed ratio of one-quarter of 1 per cent. for each change of 1d. in price would alter one of the basic principles of the sliding-scale.

Mr. Forstall follows up his criticism by a suggestion, whereby he believes that equality might be established, and which would he seems to think be preferable to the present plan. "There is no good reason," he remarks, "why the "savings effected by management better than the average "should not be divided equally between the consumers and "the company." That would not do. Mr. Forstall appears to consider the position as though there would be nothing but a continuous record of saving. That is not the case; and when through commercial adversity, it is necessary to raise the price of gas, and lower the dividend, the proprietor's loss only represents the 1 in the ratio, while the consumer's represents the 5, 6, or 7 as the case may be. That is to say, to take an extreme case, if a reduction of 1d. in the price of gas represents £80,000, and the proprietors only receive something a little above £13,000, when the price goes up by 1d., then the boot would be on the other leg, and the consumers would give up £80,000 and the proprietors (say) only £13,000 odd. With equality in the division of savings, there must be equality in losses; and we can well conceive bad times in which, under such a system, the market values of gas stocks would be terribly mauled about, and the credit of the concerns would severely suffer. Such oscillations would do an undertaking no good. Moreover, equality in the sharing of savings would widen the periods between reductions so considerably, and cause them to be fewer, that we are of opinion that, on balance, taking also bad seasons into consideration when the price would have to be raised, the proprietors' condition under Mr. Forstall's plan would be worse than that under the existing circumstances. The retarding of reductions in these times also means, in some degree, the repression of business development, and that would not be good in these competitive days. That is the only point upon which we disagree with Mr. Forstall.

Tramways and Gas-Pipe Work.

The owners of pipes in the subsoil of our roads, which pipes have been placed there under parliamentary powers, have a just cause of complaint that the newer users of the road surfaces have, while adding to the damage-inflicting conditions of the subterranean tenancy, made more complex than ever the circumstances under which work can be done to pipe distribution systems, and so have concurrently added to the costliness of the work. The motor and the tramway traffic of the times subject underground pipes to a continuity of tremors that in the olden days was not experienced; and this has ill-effect on pipe-joints, and, in loose and made-soil, in affecting the bed support of the pipes. Furthermore, electric tramways are spreading their tracks in all directions—outwards, inwards, and by intercommunication; and these tramways throw a solid concrete bed right over the gas and water systems reposing in the roadways. This causes increased expense in obtaining ready and complete access to the gas and water pipes, and in carrying on the ordinary work of connection making, repair, enlargement, replacement, and so forth. Of course, it cannot be expected that there should be any stoppage of the progress of public convenience by any preferential consideration for the older inhabitants of a roadway; but with the extension of these road-sealing tramways, the question of accessibility becomes of increasing importance to all gas and water pipe owners. The additional expenditure to which they may thus be put through the presence of the tramway in individual cases may not be large, but in the aggregate the cost, of course, mounts up to a respectable total.

The Tramways Act of 1870, section 32, provides for the reimbursement of the extra expense to which gas and water and other pipe owners are put through the presence of the tramways, by providing that the construction of a tramway shall not interfere with the rights of local and road authorities, or gas, water, or electric light companies to deal with roads for the purpose of repairing, laying down, or removing mains, pipes, &c.—due notice being given of their intention to do so when the contemplated work will interfere in any way with the traffic or affect the tramway; and sub-section 5 provides that any extra expense in doing such work caused by the existence of the tramway shall be borne by the tramway company. There is a clear opening here for a considerable amount of friction; but it points to the good sense of gas and water companies and tramway authorities that so little is publicly heard of any dispute, which indicates a very general harmonious settlement of the many questions which work of the kind referred to raises. The Bristol Tramway and Carriage Company, however, some time ago failed to see the righteousness of certain claims made by the Bristol Gas Company in respect of the extra

expense to which they had been put in connection with their distribution system through the existence of the tramways. But the legitimacy of the claims have been sustained from Arbitrator to the Court of Appeal, as was seen by a brief reference to the judgment of the latter in our "Legal "Intelligence" last week. The length of that reference is not any criterion of the general importance of the matter before the Court.

There is no particular point to be made regarding the circumstances of the Bristol case *per se*, save one which was discussed at length, and that is as to the test that is applied, under the Act, to ascertain whether the claimants to excess expenditure are justified in their claim. The test applied is as to whether the work done causes an interruption of the tramway traffic. That is, to say the least, a singular and a fallacious test. A gas or water company might exercise the fullest prevision and the greatest care in executing the work, and they might go to some expense in their endeavour to avert interruption of the tramway traffic; but all this would be counted to their detriment if, through it, there was no interruption of tramcar-running. There is certainly little encouragement in the test to pipe-owners. In the case of Bristol, the Tramway Company contended that there was really no interruption of their traffic. That was putting a feather in the cap of the Gas Company; but the Tramway Company further submitted that what they wished to enter to the credit of the Gas Company disentitled them to the extra expense which they claimed. There is an interesting conflict of virtue, acts, and title here. The Appeal Lords, however, held that there was interruption of the tramcars. It is a critical point to have to determine after the event; but their Lordships clearly drew practical conclusions from the information before them.

The Standard Burner Bills.

THE notices have been published of the joint promotion which will be known as the Gas Companies (Standard Burner) Bill, or rather we should say Bills, as it is learned (upon inquiry of Mr. F. E. Cooper, the Secretary of the Gas Companies' Protection Association) that the parliamentary authorities require, having regard to the number of companies concerned, that there should be three Bills. One of them is to be promoted by not more than ten companies, representative of the whole—that is to say, the group of ten is to have in its composition companies supplying a high illuminating power and a low illuminating power, companies subject to the sliding-scale and maximum dividend companies, as well as companies situated in different parts of the country. It is, however, a matter of understanding with the parliamentary authorities that the three Bills may, if circumstances permit, be amalgamated into one during their passage through Parliament. But, whatever happens, the Committee of the Association having charge of the Bill have very properly decided that, for the purpose of the division of the costs, the three Bills shall be deemed to be one. The notices of the Bills are identical; and a copy, with the groupings of Companies for the three Bills, is published in this issue (p. 548). It will be remarked that there are (if we take the British Gaslight Company, who have joined in respect of three of their stations, as representing three concerns) 49 undertakings interested in the joint promotion. These Bills will, so far as can be seen at the moment, constitute the feature of most general interest in gas legislation in the coming session. At present, the prospects are not brilliant for a busy time, so far as gas matters are concerned.

The Art of Illumination.

THE Illuminating Engineering Society has had an excellent send-off at the hands of the first President (Professor Silvanus Thompson, D.Sc., F.R.S.), a master in the scientific world who is admired for his perfectly independent and honest view. His address limned the useful work that is before the Society, if carried out by avoiding those many gaping loopholes through which bias may penetrate, and unjustifiable injury be dealt. The predominant claim for the Society is that it will present to the art of illumination an impartial platform. So long as it does this, so long as it avoids questions of commercial contention, and devotes itself exclusively to matters of common concern—and there are many in which the whole of the illuminating agents are interested, together with physiologists, ophthalmic surgeons, architects, builders, road surveyors, and, in fact, the whole body politic—all will be well. The President placed before the considerable audience that he had last Thursday a fitting scheme of work; and his case justifying the existence of such a Society—always presuming impartiality—was complete. We are only standing at the threshhold, as he shows us, of knowledge of the art of illumination. What knowledge there is requires accumulating, and there are many blanks in the knowledge that need to be filled in. The newest of the means of lighting are but as the things of yesterday; and it is their coming, as well as the rivalry of the illuminants, that have accentuated the need for the collection and coordination of present knowledge, and the penetration of that which is at present indifferently known or absolutely unknown. The Society has started well. That is agreed. It has before it a big expanse for useful exploration work. That too is agreed. It is the keen commercial rivalry that we fear will undermine the platform of impartiality. There are at present few gas men in the Society. But let the work proceed; and if, as time passes, the impartiality continues, the organization will undoubtedly attract greater numbers from the ranks of the gas industry. It must not be forgotten that the origin of the Society was essentially electrical; and if its inception had been with the gas interests, the electrical would have held back. There is one thing the Society must guard against, and that is any attempt to accomplish too much in a short space of time. Ambitions are great; but there must be care in their pursuit. Most professional men—particularly those in official position—have their hands pretty full; and the claims on time of present organized effort are already great. It cannot therefore be expected that a considerable amount of time can be devoted by them to this one line of work—fascinating as it always will be. Those who go slowly sometimes go farthest.

Gas Managers and Fees.

The Corporation of Greenock were much in evidence last week, in connection with the trial, lasting four days, which began before Lord Mackenzie in the Court of Session, in the action by Mr. W. Ewing, formerly Gas Manager at Greenock, against the Corporation. The evidence is reported at considerable length in another column. A decision in the case need not be looked for till January, as the speeches of Counsel will not be taken till the 21st of December. It is to be noted that the Corporation, in their defence, made no attack upon Mr. Ewing's ability, but rather appreciated him; and also that among the witnesses who testified against Mr. Ewing, there was not a single gas manager. The case turns upon the terms of engagement, and will probably be very largely affected by custom in the matter of employing gas managers to do engineering work.

The Last City and Guilds Examinations.

In another part of the "JOURNAL" will be found some extracts from the report just issued on the general work of the Department of Technology of the City and Guilds of London Institute which bear upon the examinations in the two subjects in which our readers—at all events the junior ones—are interested. It is gratifying to find that both "Gas Engineering" and "Gas Supply" were taught in twenty-two centres last year, compared with nineteen in 1907-8; and that the number of students in attendance was nearly double—652 against 351. There were 20 more candidates for examination in the first-named subject; but in the second there were 122 more—315 compared with 193. Out of the 311 students in "Gas Engineering" who went up, 173 passed; but all the "Gas Supply" students presented themselves, and 191 passed—the failures in the two subjects being respectively 44·3 and 39·3 per cent. Our readers will see, from the particulars given elsewhere, how these young men succeeded in dealing with the papers submitted to them by Mr. W. Doig Gibb and Mr. J. H. Brearley. As to the quality of their work, Mr. Gibb says that the papers in both grades in his subject varied from very excellent ones down to exceedingly poor ones; but he adds that all the prize winners certainly merited their awards. Mr. Brearley has more to say about his examinees, whose papers showed "enormous disparity" in their qualifications. While many of those which secured a first-class pass could not be too highly spoken of, he expresses regret that so many candidates presented themselves who were "obviously unprepared" for an

examination of the character of that which he was conducting. He says the figures of passes and failures clearly indicate a need for more systematic training. He thinks most of the candidates must have been "denied the means of obtaining tuition by approved educational institutions;" and he urges upon the education authorities of all large towns the importance of making extended provision for such candidates. Meanwhile, all intending students of "Gas Supply" will do well to read carefully the answers to the questions set at the last examinations, to be found in the early numbers of the last volume of the "JOURNAL." They will then be in a position to gauge the amount of knowledge required to satisfy the Examiner as to their proficiency.

The Output of Coal in 1908.

Ploughing through the figures of an average Blue-Book is not a popular form of recreation; but such a process often provides the only available means of arriving at valuable information. And in the case of Blue-Books, as with other things—there are degrees. Some are more interesting than others; and in the former category must be placed the annual Home Office report which furnishes statistics compiled by the Chief Inspector of Mines with regard to the output and value of the minerals raised in the United Kingdom, the amount and value of the metals produced, and the exports and imports of minerals. No one is independent altogether of coal (the consumption of which in this country rules round about 4 tons per head of the population); and no one certainly can afford to ignore statistics regarding it, which are perhaps the surest existing index to the national prosperity. But though all are concerned, it does not follow that everyone is prepared to sit down and read through the Blue-Book. Many will desire to get the main facts in a more condensed form; and for their benefit the recently issued report, dealing with the year 1908, is noticed in another column to-day —so far as it relates to coal and other matters of importance to "JOURNAL" readers in particular. What the country gains by its mineral resources is shown by the statement that the total value of the minerals raised last year was £130,003,670. This is an enormous figure—even though it be a decrease of £5,275,418 as compared with 1907. It need not be stated that coal is the principal of these minerals; the output in the year 1908 having been 261½ million tons, the value of which was £116,598,848. This was over 6¼ million tons less than in the preceding twelve months, which constituted a record period; and the falling off in value was somewhat greater in proportion—the average price of the coal having come down from 9s. to 8s. 11d. per ton. Singularly enough, the reduction in the total output very fairly corresponds with the smaller "quantity remaining for home consumption for all purposes;" so that United Kingdom coal, and coal equivalents, must have been in somewhat greater request proportionately (when comparison is made with the preceding twelve months) in some other places than has been the case in the United Kingdom. This, however, is merely mentioned here as an obvious deduction from the report, and is not in any way intended as a suggestion for politicians. As a matter of fact, there was a decrease of just over a million tons in the epxorts proper; but this was counterbalanced by the greater quantity of coal shipped for the use of steamers engaged in foreign trade. Anyhow, the total quantity of coal, including coke, briquettes, and shipping, which was taken from the country was 85¼ million tons —leaving 176¼ million tons for home consumption. The value of the coal, coke, and briquettes exported was £41,600,000. The worth of the coal raised in this country during the past thirty-six years is no less than £2,361,701,000. This means that 6592½ million tons have been raised; and of this amount 1490 million tons, or nearly 23 per cent. of the total production, have been shipped abroad as exports in the form of coal, coke, and manufactured fuel, and as coal used for steamers engaged in foreign trade. In the five years from 1873 to 1877, the amount so shipped was 13·8 per cent.; and in 1908 the proportion had risen to 32·6 per cent. In 1908, 18½ million tons of coke were made, of which more than 7¼ million tons came from 1452 gas undertakings, and the remainder from 26,214 coke-ovens. The average price of coal in the London market, it may be pointed out, was 17s. 6d. per ton in 1908, compared with 19s. 9d. per ton in 1907, and 15s. 9d. in 1906.

And Present Prospects.

The major portion of the above remarks refers to 1908—and the remainder to earlier years. But since the period dealt with in the Home Office report, almost another year has elapsed; and it is only natural that the thought should arise, What about 1909? A definite answer will not be forthcoming yet awhile; but, as has already been pointed out in the pages of the "JOURNAL," in the meantime the signs are not promising of record figures. As was stated in our columns last week, a question in the House of Lords some days ago as to the effect of the Mines Eight Hours Act led Earl Beauchamp to state that the Inspectors of Mines had reported that since July 1 there appeared to have been more or less generally in England and Wales some decrease in output. Though this decrease in very exceptional cases seemed to amount to 10 per cent. or more, the average, he said, was a great deal smaller, while in Scotland there had been little or no decrease. Then other causes tending to restriction of output were also cited —depression of trade, and strikes and difficulties with the men, "which were naturally to be expected before they were able to adjust themselves to the new conditions." Of the difficulties with the men which were thus "naturally to be expected," there has been no lack; and so far from "adjusting themselves to the new conditions," things seem just as unsettled now as ever they were. One colliery was cited as having cut the knot of all the troubles occasioned by the Act, by giving notice of their intention to close down; while there has recently been quite a ferment over the negotiations for bringing the Act into operation in Northumberland. As the time approaches when the present wages agreement in South Wales may expire, the feeling of uncertainty as to what will happen tends to seriously handicap forward business. At the end of next month, three months' notice to terminate the arrangement may be given by either side; and the general idea is that a new agreement will be insisted upon. But in any event the agreement holds over this year, and the feeling of apprehension is in regard to entering into contracts over 1910; so that this particular question need not be taken into consideration when reviewing the effect of the Eight Hours Act on the current year's output. There are enough points for the observer to take into account without including this; and when these points are carefully considered, it is impossible to avoid the conclusion that the coal statistics for 1909, when the time comes for their publication, will be found to have been unfavourably influenced by the limiting Act which will have been in operation for six months out of the twelve.

Depreciation Allowance for Income-Tax.

We received yesterday afternoon—unfortunately too late to be inserted after the letter by Mr. Cash on the above subject which appears in our "Correspondence" columns—the following letter from Mr. H. E. Jones, the Chairman of the Gas Companies' Protection Association: "In reference to the very valuable notes by Mr. Cash (who has taken a great deal of trouble in a most unselfish and loyal spirit), the question has been primarily discussed by the Committee of the Gas Companies' Protection Association, who have also had the advantage of several conferences with Mr. Cash. I desire to point out that while the constitution of the Association and the nature of the subscriptions to its fund do not admit of its independently fighting out a test-case, it is prepared to lend any assistance in bringing together those companies who are threatened with unreasonable demands, and to further in every legitimate way the co-operative joint action of such parties by way of evidence expenses, &c., if it be so desired, and upon a specific and approved case being submitted. It was with this object that I called early attention to the matter in your columns, that the Committee referred to it in their report, and that a discussion was raised at the general meeting. The Committee will be glad to hear from all companies who have already received claims to which they are contemplating an effective resistance."

An interesting gathering of the officials and workmen of the outdoor departments of the Sunderland Gas Company took place last Thursday night to do honour, in a practical way, to their esteemed Outdoor Manager, Mr. JOHN GRANT, who has this year attained his jubilee in the Company's service. Mr. Norman S. Cox, who presided, spoke very highly indeed of Mr. Grant, and Mr. C. Dru Drury (the Engineer), and others also referred to Mr. Grant in eulogistic terms. Mr. Joseph G. Kitts, the Chief Clerk, on behalf of the officials and workmen, asked Mr. Grant to accept as mementoes of the happy occasion, and as slight tokens of their high esteem for him, a solid silver cake basket, suitably inscribed, three silver flower-vases, a cheese and biscuit tray, and an oak dining-table. Mr. Grant, who was very cordially received, feelingly thanked the gathering for the many kind things that had been said about him, and told them how he had risen from a shop-boy to be successively a meter inspector, meter repairer, superintendent of Ayre's Quay Gas-Works, and finally to reach his present position; and he attributed his success to the fact of always being ready for the next step.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 562.)

BUSINESS on the Stock Exchange last week was quiet and dull as a general rule. The gilt-edged division had a better time—thanks to the subsidence of apprehension in regard to a further tightening of the screw in the Money Market. And the Foreign Market was calm, and in some lines quite cheerful. But Home Rails persistently drooped, and seemed to be quite unable to summon up the most temporary smile. The weakest point, however, was in the South African Market, where some marked uneasiness was evident. The opening on Monday showed no change; but business was so quiet and inanimate that prices shrank for want of support. Consols, however, rose $\frac{1}{8}$. Business was not very much brisker on Tuesday, and the tendency was dull for the most part, relieved here and there by some recovery. Wednesday was uneasy, disquieted by the prospect of a political struggle; and everything was more or less flat. The general tone on Thursday was unchanged; and things remained heavy and spiritless. Consols were a little lower, and there was hardly a rise anywhere. Friday cheered up a bit and showed a rather stronger front. There was some slight recovery in prices, but business was not active. Saturday was much the same, with steadiness in the gilt-edged and in the Foreign Markets; but the American and South African were flat. In the Money Market, there was a steady movement in favour of lower rates; and terms for discount and for short loans eased down to the close. Business in the Gas Market was moderate and almost wholly devoid of any salient feature. Prices continued so level that in the London Market only three quotations made any change at all; and there was only one in all the Provincial markets put together. In Gaslight and Coke issues, the ordinary provided a good average number of transactions at figures ranging from 102½ to 103¾, with one special deal at 102¼ free. Little was done in the secured issues; the maximum marking 88¼, the preference 103½ and 104½, and the debenture from 82 special to 83½. South Metropolitan was quiet and unchanged, transactions ranging from 120½ to 121. The debenture made 82¼ and 82 special. In Commercials, there was rather more doing. The 4 per cent. realized 109½ and 110, the 3½ per cent. from 104½ to 105½, and the debenture 81. In the Suburban and Provincial group, Bournemouth "B" changed hands at 16¼ and 16⅜, Brentford old at 254 (a fall of 1), Brighton original at 211 and 212, ditto new at 151½, Hastings and St. Leonards 3½ per cent. at 93½, South Suburban at 119¼ and 119½, and West Ham at 124 and 124¼. In the Continental companies, Imperial was rather active at from 176½ to 178, ditto debenture marked 96½, European fully-paid 24½ and 24⅞, and Tuscan 9½. Among the undertakings of the remoter world, Cape Town ordinary was done at 3 (a fall of 1½), ditto preference at 5¼ and 5½, Monte Video at 12⅝ and 12 11/16, Primitiva at 7 1/16, ditto preference at 5¼ and 5⅜, River Plate at 16⅜ and 16½, and San Paulo at 14 11/16.

ELECTRICITY SUPPLY MEMORANDA.

Finances of Municipal Electricity Undertakings—Investigation at Taunton—Unprovided-for Depreciation—Compliance with Regulation Insufficient—Failures—Drastic and Aggressive Operations—Tradesmen Pay for Special Street Lighting—"Meteor" Turns Tail.

IF proper investigation were made as to the conditions of municipal electrical undertakings in this country, it would be found that many are in a parlous financial state in relation to the depreciation of their assets. This is known, though not openly admitted, by numerous councillors throughout the country, whose fragile defences of the present position are easily penetrated and destroyed. How hearty the handshaking, how great the glorious prediction as to the future, when these municipal undertakings were started or purchased! But the satisfaction expressed by the handshake has turned to dissatisfaction; and the glorious prediction has been, in numerous cases, falsified by time. There are admittedly municipal electrical undertakings in excellent position; but they are undertakings with exceptionally good districts for a diversity of business. They are, however, of the minority; and it is the majority that have turned out bad investments, if consideration is given to the whole of the aspects of their position. In their cases, there is to-day screwing in every direction in order to make the revenue account look better; and at every conceivable point, the authorities are trying to provide, through the public purse, business for the undertakings, taking no thought for the morrow, and building up a heritage for their successors for which they will not be thanked. Few of these towns have any competent body who can review the position with the intelligence that is being devoted to the subject at the present time by the Taunton Chamber of Commerce; and the Taunton undertaking is representative of many others. It was in 1893 the Taunton concern was taken over by the Council; and the inflated satisfaction of the municipal body of that year has gradually declined until it has a very wan appearance. Better far for the ratepayers would it have been if the undertaking had continued a matter of private enterprise. Taunton, as well as many other similarly situated towns, cannot hold dear in memory the local bodies who, being in superior position, set the fashion for the municipalization of electricity supply. At the time that the Taunton undertaking was acquired, the Corporation obtained power to borrow the money required for a period of 25 years; and then subsequently they secured power for an extension of the period of repayment. This, of course, was a move having the single purpose of making the accounts look superficially better. But it was a bad thing. In the early days of electricity supply, loans were granted for longer periods than is now the practice; and the revision of the old practice was brought about by the enlarged experience as to the actual life of the different classes of plant, and the reticence of municipal bodies (whose constitution is ever changing) to look beyond the immediate future. The Taunton accounts have never denoted a flourishing commercial business; and the time prolongation for repayment of loans has only accentuated the case of the critics of the concern who desire to see the finances established in such a condition of soundness that the existing well-grounded fears regarding the future will be obliterated as time advances. The difference between the Council and the Chamber of Commerce is that the former have only eyes for the present, while the latter have consideration also for the future.

The Taunton Chamber of Commerce are to be complimented on the admirable and instructive report that they have had prepared by Mr. Albert C. Mole, Incorporated Accountant, on the position of the electricity undertaking—a report that is fair, and in the preparation of which Mr. Mole has been guided by taking as his basis of calculation expert views as to the life of the subjects constituting the assets of the concern. His investigation (which will be useful and suggestive in other towns) has been purely a financial one, and confined entirely to the question of the relation of capital indebtedness to its liquidation and the replacement of the assets it represents. Taking the published opinion of experts in this particular class of enterprise as to the rate at which the assets depreciate, and exempting land and buildings, he finds that the annual depreciation works out to £3312, which is equal to an equated percentage of 5¼ per cent. on the total cost of the depreciating assets. Taking this percentage on the proportion of the loans applicable to such assets—amounting to £63,298—from the respective dates (approximately) when they were raised to March 31, 1908, there is an accumulated depreciation of £31,533. Setting against this the small reserve fund, revenue contribution to capital, revenue account balance, and loans redeemed—amounting together to £20,971—it is seen that depreciation has run ahead of this amount by £10,562. Included among the assets are such valueless items as discount and expense of stock issue, and preliminary and parliamentary expenses, totalling together to £6964. Adding this to the £10,562, makes the deficiency at March, 1908, no less than £17,526. The defenders of undertakings in this position with regularity bring out the banal argument that repayment of capital and maintenance out of revenue is a sufficient satisfaction of the claim to depreciation; but only recently the Municipal Electrical Association were not admitting this in their negotiations for a depreciation allowance in respect of income-tax. But circumstances alter cases. Mr. Mole shows, by figures, on good expert authority, that the redemption of capital does not cover depreciation; and he also proves, in the case of Taunton, that the charges for maintenance and repairs do not suffice for the balance. Depreciation accumulates in spite of repairs; for all the patching up in the world will not restore a piece of plant to its original state. Therefore, as Mr. Mole very truly contends, the charging of ordinary repairs and maintenance to revenue cannot be urged as any good reason for allowing depreciation to run ahead of the loan redemption and reserve. He gives some striking figures in this connection. In the last four years of the period dealt with in the report, the average amount spent on repairs and maintenance in respect of the assets that he considers are depreciating, has only been on mains and services £17, and on machinery and other items £241; while (calculated on a recognized basis) the annual depreciation figures should have been, respectively, £976 and £2290. It must be admitted that "the mains cannot be constantly under repair; and the smallness of the amount shown is no indication that the repair of them is neglected, but when repairs are necessary they are likely to be extensive, and to be practically renewals." This present maladroit management of financial affairs will, intelligent consideration must assure, produce a serious legacy for the ratepayers of a future day.

There is a consideration, however, for present Taunton ratepayers that is not treated in the report of Mr. Mole. The position he exhibits is not the whole of the financial tale in regard to the municipal ownership and management of the concern. He shows that between a financially sound position and the actual, is a matter of £17,526. That is the position notwithstanding the fact that for many years past (in fact, almost immediately after the taking over of the concern) the ratepayers have been paying very heavy charges for public lighting—probably £800 to £1000 a year more than would have been the cost for gas lighting. The charge last year was between £2600 to £2700 for full service to 11 p.m., and about one-third service from 11 p.m. to daybreak. And the Council, we believe, are considering what more they can do in this way! However, if the figures in the report are accepted, and the unnecessary excess expenditure on public lighting for fourteen years is also taken into account, the local authority is nearly, if not quite, £30,000 to the bad as the result of their becoming electrical undertakers, and there is no prospect of any better results in future. That is not a glorious record. The

Corporation decline to meet Mr. Mole's report fairly and squarely. They will not say whether or not it truly represents the position; nor, if it does not, in what way it errs. The Council merely shuffle from their responsibility by saying that the undertaking is conducted within the terms of their parliamentary powers and in conformity with the regulations of the Board of Trade. That is not sufficient. The law is not in all respects a criterion of what is right or what is wrong. There is a class of company promoters who conduct their businesses without coming within reach of the "long arm of the law;" but they ruin many of their victims. Many municipal undertakings are run in accordance with the terms of their parliamentary powers; but in connection with them is being built up an unpleasant financial position for succeeding owners. It is argued that the revenue will not allow them to do more than they are at present doing. If that is so, then it shows the weak spot is in the prices charged. Very well. Electricity has only one real competitor, and that is gas. A business with only one competitor is not strong commercially if it cannot be conducted with prices on a paying basis. With all the bombastic talk about the superior merits of electricity over gas, this confession that it will not stand a price that will meet all financial obligations, is an admission of the strength of gas.

The susceptibility of electricity supply to failure continues to be of its several demerits. In the issue of the "Electrical Times" for the 11th inst., no less than three failures were noted. One at Brighton, one at Oldham, and one or two at Redditch. With regard to the Brighton failure, it is reported that the whole of the western part of Brighton was plunged into darkness on the previous Sunday evening, owing to the failure of the electric supply. The reporter erred. It was only the consumers and the streets relying on electricity supply that suffered. All the streets and all the private consumers supplied with gas were occasioned no inconvenience; so that the reporter was drawing upon his imagination when he suggested that the "whole of the western part of Brighton was plunged into darkness." Then, as to Oldham, it is stated that a fault on the electric supply mains placed part of the borough in darkness on the previous Friday evening. The comment on Brighton applies here. At Redditch, it is reported that one or two failures of the electrical supply recently produced a crop of complaints against the Electric Supply Company. The explanation is that the troubles in this case have arisen from the puncturing of cables by the picks of workmen engaged in street repairs. This suggests that the cables have been laid without any sufficient protection. The workmen of the gas and water companies and of builders are requested to exercise more care, and in future report all cable punctures of which they have knowledge.

The London and Suburban gas companies will note with some degree of satisfaction, seeing that it is a testimonial to their enterprise, that "the electric supply companies of London are at length realizing that, except in lighting, the gas undertakings have for too long had things pretty much their own way." The statement appears in the "Electrical Times." It will also be noted, and will not lessen gas companies' activity, that with the falling off of electricity revenue due to the metallic filament lamp, drastic measures must be taken to recover lost ground, and to popularize the use of electricity for domestic purposes generally, and that the electric light companies are rising to the occasion. Several of the companies have already started aggressive campaigns. Heating and cooking are the principal directions in which these drastic and aggressive operations are being conducted; it being recognized that, from some of the better class houses, the competing gas companies, although the lighting is electric, are deriving more revenue than the electricity suppliers. The drawback that the latter suffer from is that they have nothing so economical or efficient to offer as the gas companies with which to override them in this business. In other districts where the property is not of such high class, a bold bid, we are given to understand, is to be made for a larger proportion of the domestic lighting.

There have been time and again comment and complaint as to the extraordinary expenditure that local authorities with electricity undertakings go to in lighting main shopping streets—the extravagant lighting going on far into the night after the shops are closed. A goodly proportion of the members of local bodies is constituted of tradesmen, who are not averse to spending money on such lighting in the thoroughfares in which their businesses are located, and charging the cost on to the whole community, the greater part of which never troubles the main shopping streets after dusk. An excellent hint is to be found in two articles in the "Electrical Times," by Mr. Glenn Marston. It is that special lighting of the kind should be paid for by the tradesmen who are the chief beneficiaries. And why not indeed? Mr. Marston does not put the matter quite so bluntly as this; but that is what his articles, to all intents and purposes, advocate. He draws his inspiration in this matter from American experiences. The tradesmen in certain streets in Newark (N.J.) have erected and run flame arc lamps, with festoons of incandescent lamps across the street, entirely at their own (*pro ratâ*) expense—not a cent being drawn from the public funds for the lighting. They find that the expenditure pays, by the attraction it affords to the streets, and so to their shops. The benefit being theirs, it is right they should pay. The writer also refers to the downtown part of Broadway, New York, where again a very small amount of public lighting suffices through the profusion of advertising signs and shop illumination. The idea of letting those pay who want anything more than is considered as being a fair average amount of illumination for public safety, convenience, and use, is one that has its commendable feature. We are among those heavily taxed ratepayers who have no ardent wish to contribute more to the cost of lighting the street in which our local butcher, baker, and draper do their business, and make profit out of us and our neighbours, than we do to the cost of the illumination of the residential thoroughfare in which our own domicile is situated. But the wish of the majority is not studied in this matter. It is the minority of so-called representatives in the local electricity trading council who decide the matter, and who close their ears to all information as to high-pressure gas lighting for shopping centres. They might, however, consider the point as to tradesmen on streets specially lighted paying for it. Such a scheme would, we are confident, in this country soon cool the ardour of tradesmen on local councils for high-power and high-priced electric arcs.

"Meteor" of the "Electrical Times" has an easy way of running away from awkward criticism. These are his inane remarks on the comments appearing in the "Memoranda" for Oct. 26 and Nov. 9, on the Domestic Electrification issue: "We may be ungrateful, but we found it dull reading. There is nothing so monotonous as column after column of acrid and sour comment: a secretion compounded of pessimism and jealousy. We had looked for the sharp tooth of the serpent and the accompanying venom; and behold, we are treated to mumbling and slavering instead. The intention was good, no doubt; but the performance makes us yawn." Our friend has a pretty way of showing his tail, when directly challenged. Misrepresentation and cowardice are fittingly paired.

MORE MUNICIPAL "UNDUE PREFERENCE" IN MARYLEBONE.

THE "Debenham Despotism" still reigns unchecked in Marylebone; and it is quite evident that no scheme put forward by the Electricity Department of the Borough—however unprofitable, both indirectly and directly to the ratepayers; however grossly unfair to the other supplier of illuminant (and a substantial ratepayer) in the district; and however devoid of sound finance and fair business principles—can be too tough for the digestion of the humble "Say-Ditto-to-Debenhams" at the Marylebone Town Hall. The latest dish hastily swallowed by the Council, with a heavy smearing of "work for the unemployed" grease, consists—as will be seen from the report on p. 555—of a scheme for laying mains through every minor street and byway in the borough, in order to displace gas by electricity in the remaining 1385 public lamps in the borough.

The proposal is prefaced by a "report" upon the already accomplished substitution of electricity for gas in 1964 lamps, which is remarkable for its economy of truth and its suppression of essential facts. The report mentions how much the Lighting Committee paid for gas and maintenance in respect of these lamps prior to their conversion. It carefully omits to point out (1) that the Gas Company offered materially lower terms for the maintenance of the lamps, and (2) that the figures quoted are based on gas at 2s. 5d. per 1000 cubic feet, though the price of gas for street lighting has since been reduced to 2s. 2d. In another part of the report, the reduction from 2s. 5d. to 2s. 4d. announced last June is mentioned, but the further reduction to 2s. 2d. that was announced in September is conveniently overlooked.

The report states that "there is no question that, in actual measured candle-power, the streets have much more light than they had before." It not only adduces no proof of this statement, but it carefully omits to mention (1) that the Gas Company offered to maintain the gas-lamps at a higher efficiency than that at which they were being maintained by a contractor; and (2) that, so far were the electric lamps provided for in the original scheme from giving "more light than before," they so obviously gave less that the Electricity Department had at once to substitute lamps of higher candle power, and, of course, greater current consumption, in all the principal streets in the borough—a further but carefully concealed loss to the undertaking and the ratepayers.

The report also fails to state that the quoted charge of £2500 a year for "repairs, renewals, and maintenance" of the 1964 lamps fitted with electric burners is materially less than the actual cost, which cannot fall much, if at all, short of £3500 a year. The figures given in the report clearly prove this—though no proof is needed to anyone acquainted with the cost of lighting, repairing, and maintaining street lamps—as the cost of the same work in respect of the remaining 1385 lamps is estimated at 27s. per lamp; while that of the 1964 lamps is pretended to be only (£2500 =) 25s. 6d. per lamp, in spite of the fact that over 1100 of the latter number are twin-burner lamps, which would cost at least 10s. per lamp more than the one-burner lamps.

It is further interesting to note that the Electricity Department ask—and will therefore, of course, get—a higher annual payment than the present cost of gas (at 2s. 2d.), to say nothing of the lower maintenance terms the borough could get from the Gas Company for the asking—only they take good care not to expose their Electricity Department to competition.

Another interesting point is that it is deliberately proposed to spend £3077 more on the laying of the mains than the proper cost, in order to toady to the labour element in the borough;

"The capital cost of the mains and ducts would be (*a*) with ordinary labour £19,965, and (*b*) with 'unemployed labour' £23,042. . . . We commend the scheme to the Council, and, as the matter is one of urgency—if any benefit is to accrue to the unemployed—we have asked the Lighting Committee to give it their prompt consideration, and the Finance Committee to bring up the necessary recommendation for application being made to the London County Council for sanction to the proposed loan of £24,000 for this purpose."

The report of the Finance Committee of the London County Council on this audacious proposal—made, be it remembered, after the borough has evaded the authority of the County Council by borrowing the money they wanted for the previous scheme in an unauthorized manner, after their application for a loan had been refused—will provide interesting reading; but we doubt if it will afford as much pleasure as instruction to Messrs. Debenham and Wright, and their zealous (if not always wonderfully discreet) henchman, Mr. Seabrook.

The "discussion" of the scheme at last Thursday's meeting of the Borough Council was of the feeblest, and calls for very little comment. But one remark made in its course deserves to be noted as so thoroughly characteristic of the whole business. The report of the Electricity Committee mentions that (obviously only as a matter of form) they had asked the Lighting Committee to give the scheme their prompt consideration. "Councillor Brinsley-Harper," we read, "asked why the concurrence of the Lighting Committee was necessary!" The Lighting Committee is theoretically, and, of course, should be in reality, the buyer, the Electricity Committee only a tendering seller. But it is widely recognized that the Electricity Committee are the unchecked administrator of the Council's lighting business, so that the dragging-in of the Lighting Committee is regarded as a mere waste of time and trouble. Perfectly true; but one hardly expected the truth to be so glaringly exposed by a member of a Council which only maintains its self-respect by self-deception.

THE GREAT STRIKE OF GAS WORKERS IN ITALY.

The Company's Complete Success within Sight.

THE outlook for a speedy termination of the strike at the gas-works of the Union des Gaz—Milan, Genoa, Alessandria, and Modena—is, at the time of going to press, distinctly hopeful. Yesterday a telegram was received by the Secretary of the Continental Union Gas Company (Mr. W. Martin) that the General Manager at Milan (Signor Grüss) and the Company's legal adviser had had an interview with the public authorities; and they had agreed upon conditions on which the old staff would be re-established. These conditions were to be submitted to the men yesterday; and, as labour at Milan controls the action of the men at the other stations, it looks as though the end of the Company's present difficulties is imminent. At any rate everything was peaceful in Milan yesterday, which marked the completion of the third week of the strike.

PRIOR TO THE ABOVE INTELLIGENCE.

Before the above cheering news was received, the Company and the men on strike had—we learned at an interview with Mr. A. F. Phillips, one of the Directors and the Consulting Engineer of the Company—come closer to agreement than they had been at any time since the presentation of the extraordinary demands of the men, with which we dealt in last week's issue. These demands the men had practically relinquished. Those who have followed up the labour conditions affecting the Company will remember that there existed prior to the strike an Organico, which gave the Company very little control over the men. Upon the men striking, the Company took the firm stand that they would not restore the men to their former employment on the conditions of the old Organico. To replace it, a declaration for new regulations of work was submitted. These new conditions offered the men exactly the same pay, allowances for sickness, pensions, hours of work, and all other privileges; but, on the other hand, they gave the Company the power to dismiss men when unsatisfactory workers, and to promote men for merit and not according to service. These conditions were submitted to the staffs at the several stations. The great difficulty, however, between the men and the Company in respect of the acceptance of the new regulations was this: The strikers were willing to come back immediately and sign the new regulations, provided the Company would consent to sign them as provisional—subject to arbitration. This the Company refused to do, because experience shows that the arbitration invariably goes against the Company, owing to the constitution of the Court of Reference. The men appoint one arbitrator, the Company one, and the President of the Tribunal appoints the third; and the third is generally a man in favour of the men. What the Company said to the men in their new declaration was practically this: "We offer you all the conditions of labour you had before; but we reserve to ourselves the right to conduct our own business, to engage what men we like, to discharge men who are not satisfactory, and to promote men according to merit." And that is the only way in which a business of the kind can ever be conducted. The Company have tried other methods under the former order of things; and they have been unsuccessful.

THE WEEK'S NEWS FROM MILAN.

The hope then is that before readers of the "JOURNAL" receive the present issue, peace will have been completely restored. Meanwhile, we may run lightly over the incidents of the past week. The Company and their officials left no stone unturned to guard against all eventualities, as is exemplified by the fact that some 300 additional German workmen were drafted into Milan during one night. But throughout the week, the situation was one of great complexity and perplexity for, particularly, the Chief Engineer (Mr. Clement Hovey) and his colleague the General Manager of the Milan station (Signor Grüss). Internally at the works, things were placed in a perilous position during the week, due to the bad faith of provisional Italian workmen who had arranged a contract to work for fifteen days for a specified remuneration; but on the thirteenth day some 400 men refused further service, and demanded the full payment. As it was impossible to force them to work, and the aspect was distinctly unsatisfactory, it was necessary to place these men under military guard, and to transport them during the midnight hours to the station, and send them back to their homes. Their places were smartly filled within twenty-four hours. Towards the end of the week, other men, who had been subsequently engaged for a similar period, also declined further service, and attempted to extort full payment for the whole period, though they had only worked five days. These were treated in a similar manner to the others. These incidents give an insight into the difficulties of the work with which the officials have had to contend. The conducting and the control of all manufacturing operations with the new men, though unaccustomed to the work required of them, would have been comparatively simple were it not for the character of the Italian peasants upon whom it has been necessary to depend for manual labour. But there was hope that, with the arrival of the German workers, the officials would be able to dispense with the services of these men.

With regard to the gas service generally, the pressure, quality, and quantity of gas supplied have in reality been thoroughly good; but the Company have been assailed in regard to them by the Municipality and certain ill-disposed individuals. "Il Secolo" on Friday stated that the new Municipality had fined the Company over 70,000 frs. since the beginning of the strike. The Company, it should be mentioned, may be fined an increasing amount for every deficiency of quality or pressure of the gas; and quality refers not only to illuminating power, but also to the calorific value. The Company must supply gas of 105 litres to the carcel, and the calorific value should be 5100 calories to the cubic metre, upon which figure a "tolerance" is allowed of 300 calories. The Company have been fined for lamps defective, and for lamps injured. This indicates an unreasonable attitude on the part of the authorities towards the Company during this time of their struggle for very existence.

Some ignorant critics have also been writing to the papers, endeavouring to persuade the public that the composition of the gas is extremely poisonous—that the percentage of carbon monoxide is outrageously high, and so forth. Such foolish criticisms must have been extremely annoying, because they have some effect upon the socialistic public, ever ready to injure or to appropriate the property of others, even if those others are doing a legitimate trade, and giving thoroughly good service and satisfaction to their customers. The strikers were continually pressing the authorities to throw their influence on their side and against the Company; and, of course, the socialists dependent upon the workmen's vote, supported the unjust claims of men who had been treated, as was shown last week, with the utmost generosity by their employers.

The street-lamps it has been found necessary to keep lighted throughout the day, as the protection which would be necessary to enable them to be extinguished and relighted daily would be too great a tax upon the patience of the authorities, and would have increased the risks of injury—perhaps even have resulted in murder. A considerable number of violent strikers have been arrested on various occasions, including prominent members of the Workmen's Federation, and sentences of several months have been inflicted. In passing from one works to another at all times of day and night, Mr. Hovey has had to run the gauntlet many times; and his motor has been considerably damaged by the attacks of the strikers. It is reported in the papers that, while proceeding to one of the works towards midnight one day early last week, large numbers of strikers endeavoured to stop the car, and to injure the occupants. The Captain of the Carbinieri—a very smart officer—was with the Chief Engineer. They found themselves subjected to a volley of stones and other missiles. Stopping the car, the Captain drew his sword, and faced the crowd, which he kept at bay for a few seconds, until he was joined by a number of the military guard, who quickly cleared the large piazza in front of the San Celso works, making some arrests where there was determined resistance. The military and civil guards have, it should be said, done throughout most excellent service.

NEWS FROM THE GENOA STATION.

Last week we could not, owing to the absence of definite information, say much regarding the Genoa station, at which the Chief Engineer and Manager (Mr. Philip S. Morton), who is in

supreme control there, has done excellently well. He has been fortunate in having faithful clerks and good supporters—Cucchi, Cesari, Bickley, and others; and their devotion has been of the best throughout.

Let us stay just for a few words on the Genoa works themselves. Mr. Morton has been in charge there now some four years; and he has devoted himself thoroughly to reorganizing all the staff, which was considerably disorganized when he took over the command. He has surrounded himself with some loyal assistants; and, as mentioned above, their influence has materially assisted him in this time of difficulty. There are three stations at Genoa—Sampierdarena, Gavette, and Bisagno. At the first-named works, the retorts are all horizontals, with West's charging machinery; at Gavette they are all verticals; and at Bisagno (which are the old works), they are horizontals, hand-charged. The maximum output of gas at Genoa is 100,000 cubic metres, about 3½ million cubic feet a day; there are 5011 public lamps; and about 38,000 consumers. The coal carbonized during the year amounts to about 70,000 tons.

From these figures will be seen the extent of the responsibility that has rested upon Mr. Morton during the present time of difficulty. His clerks, the foremen at the works, and the inspectors and assistants in the town, remained faithful to him, and have rendered every assistance; and of them he cannot speak in too high terms of praise. Directly the Milan men went out three weeks ago, the men at Genoa (as well as those at Alessandria and Modena) followed suit. The early arrival of English machine men, together with the help of the clerks, enabled Mr. Morton to keep the carbonizing going without cessation; and the output of gas soon reached its normal quantity—there being only a little deficiency the first day or two. All the charging machinery and the exhausters have been driven by Englishmen since the strike, and the remainder of the work has been done by Italians. With regard to the public lighting, the lamplighters left the lamps alight the morning after the strike, with the intention of causing loss of gas. But this was really to the advantage of the citizens and the Company, as the lighting was thus maintained on a much larger scale than would otherwise have been possible. Although a considerable number of lamps were extinguished, the burners broken, pipes cut, &c., during the first days, Genoa soon resumed its normal or *quasi*-normal service.

With regard to the Sampierdarena works, it is only right that due acknowledgment should be made of the energy of the Works Manager (Mr. Bickley), who was for several years in the service of the Tuscan Company. He speaks Italian perfectly; and he soon had his men well in hand. At Gavette, the vertical retorts worked excellently—in fact, the "scratch" squads of clerks, outsiders, &c., have been doing better work with them than was being done by the ordinary men previous to the strike. But, above all, Mr. Morton's determination and firm stand from the beginning has done much in obtaining good working during the strike; and his firmness with the authorities has also had a beneficial effect. Military protection was freely given by the Prefect, who acted most loyally and impartially in guarding the liberty of work in the interests of the public service. The Chief of the Police has also given valuable assistance. The town, in order to cover its responsibility, has imposed fines nightly; but these will no doubt be contested by the Company later.

Of course, there have been the usual accompaniments of a strike. Many acts of "sabotage" have occurred every day; and two of the men were beaten by the strikers, and seriously injured. As already mentioned, damage has been occasioned to the public lamps. Writing to the Company's offices on the 16th, Mr. Morton stated that the situation at the works was excellent, though somewhat acute, as the number of men returning to work had aroused the wrath of the remainder. At the very time of writing, he said there was going on in front of his office a demonstration in which women were pleased to mix; and it had been necessary to call in force to clear the streets.

The number of men affected at Genoa was about 850. Notices were put up about a week ago discharging all men, and inviting applications from outsiders and from the old staff who wished to return on the new conditions laid down by the Company. Some 500 applications from outsiders were quickly received; and about 150 from old workmen. The latest information yesterday was that 150 men had already signed the new conditions of labour, and others were coming in continually. The collectors had also resumed work. This looks healthy.

We have been interested to receive a copy of "Literary Bypaths and Vagaries," and other papers, by Mr. Thomas Newbigging. The book, which is published by Mr. Elliot Stock, of Paternoster Row, is certain to be warmly welcomed by those who have read previous volumes from the pen of the same versatile author; and it should also prove welcome to others who have not had that good fortune.

Mr. Reginald J. N. Neville, who is the Recorder of Bury St. Edmund's, and a Director of the Brentford Gas Company, has been adopted as the Conservative candidate for the borough of Wigan, in succession to the sitting member, Sir Francis S. Powell, who is retiring at the next General Election. As most of our readers are aware, Mr. Neville has from time to time been engaged in cases affecting the gas industry, both at the Law Courts and before Parliamentary Committees.

HISTORY OF THE LIGHTING OF STRASBURG.

Souvenir of the Jubilee of the Continental Union Gas Company.

THE close of fifty years of work, whether by an individual or by a number of people associated together in one enterprise, is generally regarded as a time when retrospect is not only permissible, but sometimes profitable. In the case of a collective undertaking, those who have been connected with it from the commencement naturally feel a pleasure in reflecting that the early difficulties attending a new venture have been successfully overcome, and the concern placed on a sound commercial basis. At such a period in the history of a private business or of a company, any available particulars in regard to its past possess special value for those engaged in it; and should they be collected in permanent form they are generally perused with much interest, and preserved for subsequent reference. It was probably a consciousness of the existence of this feeling that prompted the Directors of the Union des Gaz (the Continental Union Gas Company) to have prepared an account of the progress of the business of gas supply at their Strasburg station from the time they took it in hand in 1858 till the end of 1907—the period of fifty years for which their first concession was granted. The book has been produced by M. Gaston Kern, the Manager, who has sent us a copy of it. When we say that it is a volume of upwards of 300 large quarto pages, it will be evident that the author had a long story to tell. He did not, however, confine himself to the fifty years' operations of the Company, but compiled a history of the lighting of Strasburg from its origin to the present time. It is an exceedingly interesting book; but it is impossible to do more now than briefly indicate the nature of its contents; leaving a fuller notice of them for some future occasion.

The work is divided into two parts—the first consisting of an introduction and a collection of historical documents bearing upon the subject; and the second comprising some comments upon these, followed by the story of the lighting of the city. As the author points out, old documents concerning private lighting are rare; but for a hundred years chronicles of the public lighting of Strasburg have been in existence. This branch of the municipal service has always been in the hands of companies, whose successor is the one now entrusted with it. The first document is an edict promulgated by Louis XIV., in June, 1697, ordering lanterns to be generally employed for lighting the streets. This is followed by an interesting series of documents occupying about 50 pages, and covering the period to the end of 1778, when the first treaty was entered into for lighting the city with oil. This system was continued till 1838, when gas was adopted under a treaty lasting twenty years. In 1858, as mentioned above, the fifty-years treaty was entered into with the Continental Union Company. These documents are followed by details of the legal standard of light, and lists of the streets in the city and suburbs in which mains have been laid. This brings us to the second part of the book. The comments on the documents and some interesting historical particulars bring us down to p. 229, where the story of the Continental Union Gas Company begins. Above the chapter heading is a portrait of Sir Julian Goldsmid, the Chairman of the London branch from 1892 to 1896. Over leaf is one of the first Manager—M. Weill-Goetz. A plan of the works shows their extent up till 1861; another as they were in 1870. This was a terrible year for Strasburg, and, of course, the gas-works suffered, as shown by two excellent views. We now come into later times, and have particulars of the works as they now stand, equipped with up-to-date plant. There is a chapter on the Auer burner, the public lighting arrangements, meter and stove hire, gas consumption, &c. This is followed by one showing how the employees of the Company are cared for; and the final chapter furnishes particulars of the arrangements made for filling balloons.

It only remains, for the present, to say that the book is an excellent specimen of typography (each page has a red-line border), and that the text is interspersed with a large number of illustrations and portraits, which come out well on the fine art paper used for the work. On the title-page is an effective reproduction, in gold and colours, of the ancient banner of Strasburg.

Proposed Memorial to the Late Mr. W. Young.

At the meeting of the North British Association at Stirling in July last, on the motion of Mr. J. W. Napier, of Alloa, it was remitted to the Committee of the Association (with power to add to their number) to consider the matter of providing a memorial to the late Mr. William Young, of Peebles. The Committee met in Glasgow last Friday, Mr. A. Waddell, of Dunfermline, the President, in the chair. The Committee, after consideration, resolved to make an endeavour to raise a fund, to be capitalized and the proceeds employed in the provision of a lecture to be delivered at the annual meeting of the North British Association, and to be known as "The William Young Memorial Lecture." Mr. Alex. Bell, jun., of Peebles, was appointed Hon. Secretary and Treasurer of the fund.

The death occurred on Monday last week, at the age of 77, of Sir Frederick Dixon-Hartland, M.P., who was Chairman of the Thames Conservancy from 1895 to 1904, in which period his name frequently came before the public in connection with the Metropolitan Water Question.

THE LAST GAS EXAMINATIONS.

Report of the City and Guilds of London Institute.

We have received from the Superintendent of the Department of Technology of the City and Guilds of London Institute (Sir Philip Magnus, M.P.) the report on the work of the department during the past session. We extract from it a few particulars as to the examinations in "Gas Engineering" and "Gas Supply."

Dealing first with the general work of the department, it may be mentioned that the number of subjects in which examinations were held last session was 73, compared with 72 before; and the number of separate classes was 4021, against 3604—the former figure being the highest on record. The number of students in attendance was 48,897, compared with 48,223. In the subjects "Gas Engineering" and "Gas Supply," the number of students increased from 351 to 652, and of candidates from 484 to 626. The programme for the session 1909-10 was issued in July, and was noticed in the "Journal" at the time. Among the alterations in the syllabuses was the decision to have a practical test in the Honours grade examination in "Coal Tar Products."

Turning to the tables which give the results in the separate subjects, the report shows that in the two relating to gas there were 22 centres, with 652 students in attendance, compared with 19 and 351 before. The candidates numbered 311 in "Gas Engineering," and 315 in "Gas Supply," compared with 291 and 193 before. In the Honours grade, in the former subject, 26 passed in the first class, 47 in the second class, and 43 failed; while in the Ordinary grade the passes were 40 and 60 respectively, and the failures 95. There were consequently 173 passes and 138 failures, or 44·3 per cent. In the Honours grade in "Gas Supply," 20 candidates passed in the first class, 32 in the second, and 28 failed; while in the Ordinary grade 58 passed in the first class, 81 in the second, and 96 failed. There were here consequently 191 passes and 124 failures, or 39·3 per cent. Of the total number of students in the two subjects, one who attended classes at the Battersea Polytechnic passed in the Ordinary grade in "Gas Engineering" and two in the Ordinary and one in the Honours grade in "Gas Supply." At the Goldsmiths' College, 25 candidates went up for examination, and 17 passed in "Gas Supply"—13 in the Ordinary and 4 in the Honours grade. From the classes at the Regent Street Polytechnic 28 students were examined in "Gas Engineering" and 9 in "Gas Supply." Of the former, 11 passed in the Ordinary and 6 in the Honours grade—one of the successful candidates being a prize winner. Of the 9 candidates examined in "Gas Supply," 8 passed—6 in the Ordinary and 2 in the Honours grade. There were 28 students at the Woolwich Polytechnic, and 8 were examined—4 in each of the subjects; but only two passed, and both in the Ordinary grade. From the various schools of the London County Council, 3 out of 50 students were examined in "Gas Supply;" and only one passed, and it was in the Ordinary grade. One candidate was examined in "Gas Engineering" and one in "Gas Supply" in Melbourne; and the former passed in the Ordinary grade.

Reporting upon the work of the students in "Gas Engineering," the Examiner (Mr. W. Doig Gibb) says the merits of the papers were very varying in both grades—running from very excellent down to very poor ones; but all the papers of the prize winners merited the awards they gained. Some little confusion appears to exist in the minds of students with regard to the instructions as to answering alternative questions. A number of candidates in the Ordinary grade answered both questions where only one was allowed; while two did nine questions instead of the eight specified. In the Honours grade, eight candidates did both of the alternative questions, and one answered nine.

Mr. J. H. Brearley, the Examiner in "Gas Supply," regards the great increase in the number of candidates presenting themselves for the Honours grade examination as indicating that the need for technical training in gas distribution is receiving much more attention than hitherto. With regard to the papers worked, he says they showed "enormous disparity" in the qualifications of the candidates, even in the same grade. While many of the papers which secured a first-class pass could not be too highly spoken of, it was to be regretted that so many candidates presented themselves who were obviously unprepared for an examination of such a character. In the Ordinary grade, there were no less than 45 students, or 19 per cent., who obtained fewer than 30 per cent. of the total possible marks. There were 35 who attempted fewer than six questions; while 37 others tried to answer six only. Mr. Brearley offers the following observations on this matter: "When it is remembered that the candidates had a choice of no less than fourteen questions all coming strictly within the purview of the syllabus, these figures indicate clearly the need for more systematic training." He considers that most of these candidates must have been denied the means of obtaining tuition by approved educational institutions; and he again urges on the education authorities of all large towns the importance of making extended provision for such candidates. In the Honours grade, only seven papers, or 8·75 per cent. of the total, obtained less than 30 per cent. of the possible marks. While there were few papers of marked excellence in the Ordinary grade, Mr. Brearley says those which obtained first-class Certificates in the Honours grade were of a high order. In this grade, however, few candidates appeared to understand the use of squared paper for plotting illuminating curves; and as the relative values of various competing forms of artificial illumination become of greater importance each year, he thinks that a deeper study of this branch of gas supply may be usefully commended to candidates. Those who presented themselves at the last examinations appeared to appreciate very much the setting of alternative questions, for out of 80 candidates no less than 75 attempted one of them.

The questions in "Gas Supply," with the answers, were given in the last volume of the "Journal" (pp. 105, 172, 243). The names of the successful candidates in both subjects will be found in the issue for the 6th of July (p. 21), and those of the prize winners in that for the 27th of July (p. 258).

GAS ACTS FOR 1909.

There were two Acts—the Bury Corporation Act and the Mountain Ash District Council Act—that were not available for notice in their proper order when reviewing the current session's measures in which gas powers appear. Copies of the Acts have since been issued.

In the Bury Act, lands are scheduled for gas manufacturing purposes; and powers are given for constructing a railway and sidings (with store yard) in conjunction with the Lancashire and Yorkshire Railway. The limits of supply are defined as the borough, and part (as described) of the township of Tottington Lower End. The standard illuminating power of the gas is prescribed to be of 12 candles, tested by the "Metropolitan" No. 2 burner, with the bar photometer and Harcourt's ten-candle pentane lamp. The price to be charged for gas is limited to 5s. A clause in the Bill that was to give the Corporation power of inspection in the case of pipes to be covered over has been removed; as has also been the clause providing that, upon inspection of a prepayment gas-meter by a collector, if the amount due in respect of the gas shown to have been consumed was not found in the box, it should be deemed not to have been paid, and for it the consumer should be liable. There was a clause in the Bill providing for all payments out of the general fund and for all receipts being carried to that fund, but a separate financial statement for the undertaking was to be kept; and when it appeared from this statement that the receipts exceeded the amount of the payments, the Corporation were to make in the next ensuing year such reduction in the prices charged for gas as should amount as nearly as possible to one-half the amount of the difference between such receipts and payments. This clause has now been superseded by a more extended one, which does not provide for the mixing up of the payments and receipts with the general fund, but which imposes the keeping of separate accounts, and defines the purposes to which the revenue is to be applied. These purposes are the ordinary ones, and include the formation of a reserve fund, and, very properly, the "making good to the general fund any deficiency in the revenues of the Corporation in respect of the gas-works undertaking which may at any time hereafter have been provided out of the general fund or general rate." Then, towards the end of the clause provision is made for excess profits being divided between the general fund and a reduction of the gas charges. The exact wording is:

> And the Corporation shall carry to the general fund one moiety of so much of the balance remaining in any year of the income of the gas-works undertaking (including interest on the reserve fund when such fund amounts to the prescribed maximum) as may, in the opinion of the Corporation, not be required for carrying on the gas-works undertaking and paying the current expenses connected therewith, and the other moiety thereof shall be applied in and towards the reduction of the gas charges of the Corporation.

[*Parliamentary Agents: Messrs. Lewin, Gregory, and Anderson.*]

In the Mountain Ash Act, there are a number of ordinary gas clauses, one that is not so, and a variation of the prepayment meter clause. The unusual one refers to stand-by supplies, and is as follows:

> Notwithstanding anything contained in the Gas-Works Clauses Act, 1871, or any other Act, a person shall not be entitled to demand from the Council a supply or the continuance of a supply of gas for premises having a separate supply (that is to say, a supply from an installation other than that of the Council) unless he shall have previously agreed to pay the Council such minimum annual sum as will give to them a reasonable return on the capital expenditure and standing charges incurred by them to meet the possible maximum demand for those premises; and the minimum annual sum to be so paid shall be determined, in default of agreement, by arbitration in manner provided by the Arbitration Act, 1889.

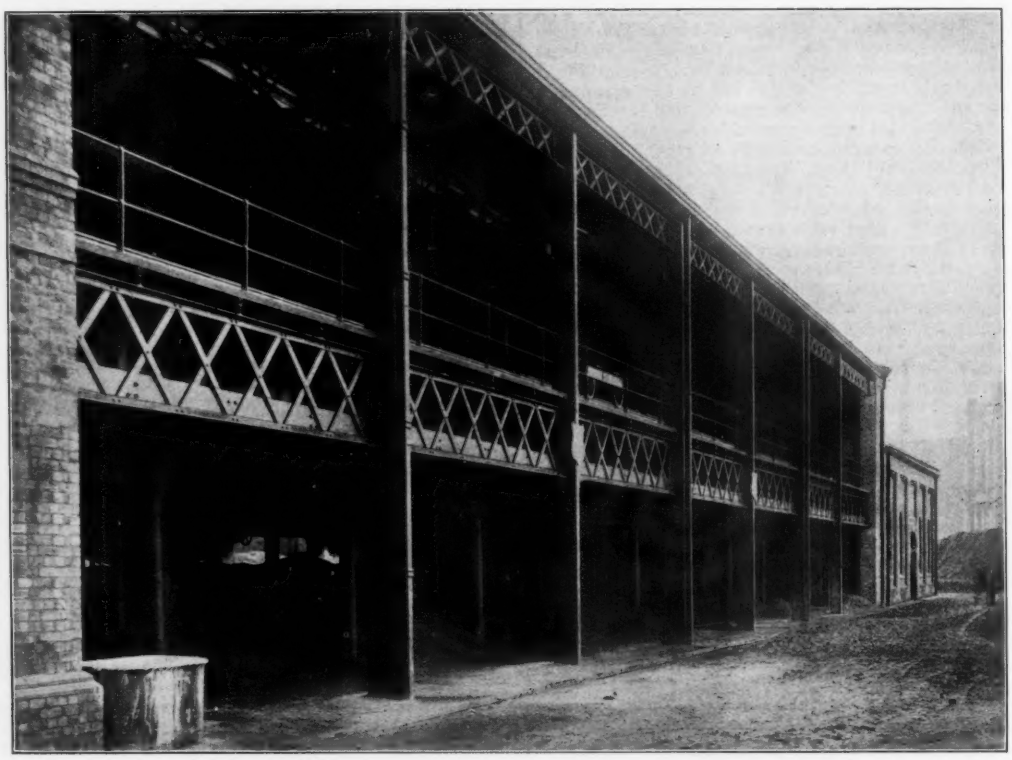
The prepayment meter clause is varied by the provision that the maximum charge for the hire of a prepayment meter without fittings shall be at the rate of 8d. per 1000 cubic feet of gas supplied through the meter. [*Parliamentary Agents: Messrs. Baker and Co.*]

We learn from the annual report of the Directors of the Continental Union Gas Company, Limited, some particulars from which are given elsewhere, that Mr. Arthur Lucas has, to the great regret of his colleagues, resigned the chairmanship of the Company, after occupying the position for nearly eleven years; and that Mr. J. H. Birchenough, C.M.G., has been elected to succeed him. We also learn that Mr. R. Hesketh Jones has retired from the Board,

PROGRESS AT CARDIFF.—NEW PURIFYING PLANT.

A small party of Directors of the Cardiff Gas Company and friends assembled in the offices at Bute Terrace last Wednesday morning, preparatory to driving to the Grangetown Works for the purpose of witnessing the turning of gas into new purifying plant which has just been erected.

Among those present during the proceedings was the Lord Mayor of Cardiff (Councillor J. Chappell), who, singularly enough, was about a quarter-of-a-century ago working at Grangetown in the employ of the Company whose guest he was that day. The veteran Chairman of the Company (Surgeon Colonel W. Taylor, M.D., J.P.), in spite of his age of eighty and more years, was the life and soul of the gathering, and showed, while on the works and subsequently at the luncheon, that he had all the technicalities of gas manufacture at his fingers' ends. He was supported by the Deputy-Chairman (Colonel H. Oakden Fisher, J.P.), and by Messrs. Charles E. Dovey, J.P., J. P. Ingledew, J.P., G. C. Williams, J.P., and W. Morgan Lewis, J.P., all members of the Board. On the tour of inspection, the party was accompanied by the Manager and Secretary (Mr. George Clarry), the Engineer (Mr. H. D. Madden), and the Works Superintendent (Mr. A. E. Williams); while the Contractors for the new purifiers, Messrs. Willey & Co., of Exeter, were represented by their Chairman (Mr. F. Templer Depree, J.P.), their Chief Engineer (Mr. H. L. Morley) being also present.



Elevation of the New Purifier House and Oxide Store at the Grangetown Gas-Works, Cardiff.

An Increasing Business.

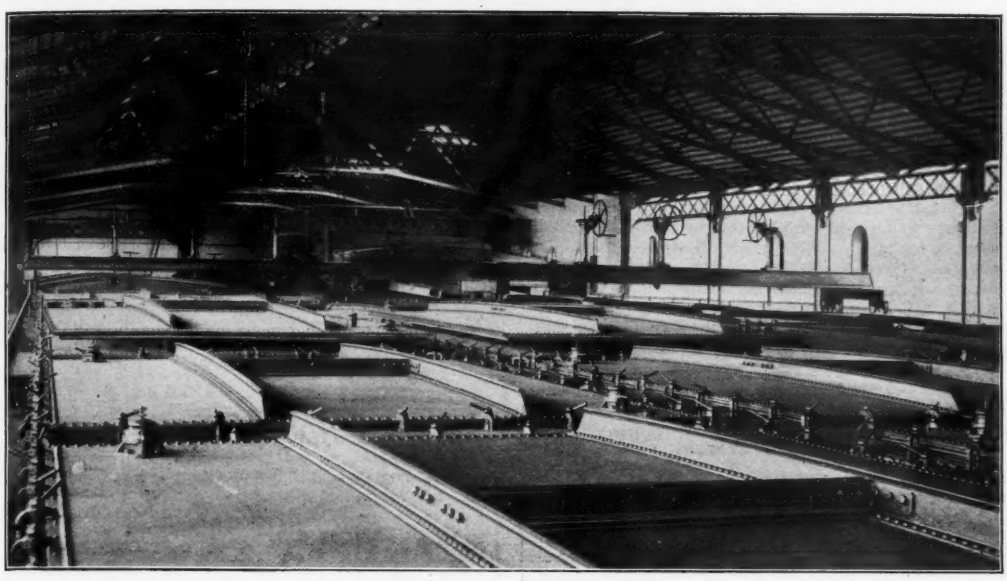
Before dealing with the particular object of the visit to the works, a few words may be permitted with regard to the general business of the Cardiff Gas Company, which, it is a pleasure to record, exhibits a steady increase. In spite of the effect of the Miners' Eight Hours Act upon the City, through its shipping and other interests, Cardiff goes on prospering, and the Gas Company with it. Speaking of the Eight Hours Act, the writer has, when visiting South Wales, taken such opportunities as have presented themselves of trying to find someone who will express a favourable opinion of the Act now that it has been for some while in operation; but the quest has not been successful. There may certainly be persons who still regard the measure as a beneficent one; but if so, they seem difficult to find. This, however, is a digression. In 1904, the consumption of gas in Cardiff was 834 million cubic feet, and last year it was 1145 millions; while for the present year it is confidently anticipated that the make will reach 1250 millions. Results like these cannot, of course, be achieved—in the face of strong competition from municipal electricity—by the adoption of a policy of "masterly inactivity;" and therefore it is unnecessary to say that such a policy does not pertain to this Company. On the contrary, everything imaginable is done to attract custom, with the result that there are now something like 33,000 consumers, of whom 12,000 have prepayment meters. While the price of gas to ordinary consumers is 2s. 7d. per 1000 cubic feet, the Corporation are selling electricity at 3½d. per unit—sometimes, and at other times possibly a good deal less. Then it should be mentioned that the charge for gas-engines is 2s. 4d. per 1000 cubic feet; and there is a 5 per cent. discount off both prices, if the aggregate consumption reaches 200,000 feet in the quarter.

The Uses of Gas.

The many uses of gas are brought home to inquirers—as well as the multiplicity and artistic character of the appliances designed for lighting and heating—by a visit to the spacious showrooms which occupy a large portion of the ground-floor of the Bute Terrace offices. Here is to be seen an exhaustive collection of burners, fittings, fires, cookers, boilers, radiators, &c.; many of the more elaborate of the fittings being displayed to great advantage in large glass cases. Mr. Clarry has seen the difficulty in getting people to come from a distance to the Central Office; and so a branch has already been opened at Penarth, with others in contemplation, where consumers can call and pay their accounts, or transact such other business with the Company as they may desire.

A successful maintenance system is in operation, under which a charge per quarter, for ordinary upright and inverted burners, is made of 7d. per burner for less than six burners, 6d. per burner for six burners and over, and 5d. per burner for churches and chapels. For high-power self-intensified burners, a charge of 1s. per quarter is made. The minimum charge in respect of any premises is 2s. per quarter. Lamps are inspected monthly; but should any mantles or chimneys be required in the interval between the inspections, they are supplied on receipt of written instructions. The charges named, of course, do not include cost of replacement of breakages caused by carelessness; and maintenance is only undertaken upon burners and mantles being in good order. Portions of an incandescent system on any premises are not accepted for maintenance.

Outside the offices, there is an excellent example of Keith high-pressure lighting; and numerous installations of Graetzin and other high-power lamps in different parts of the city help to testify to the capabilities of gas for lighting when consumed under the best modern conditions. The City Engineer (Mr. W. Harpur), too, is doing good work in converting in the public lamps the old flat-flame burners into incandescent lights. This is being done as fast as he can get capital for it; for in the city proper the Company are merely responsible for the supply of gas. In the outside districts, however, where they have the lamps under their control, all the lights have already been converted, with very satisfactory results.



Interior of the Purifier House, Showing the Lifting Gear.

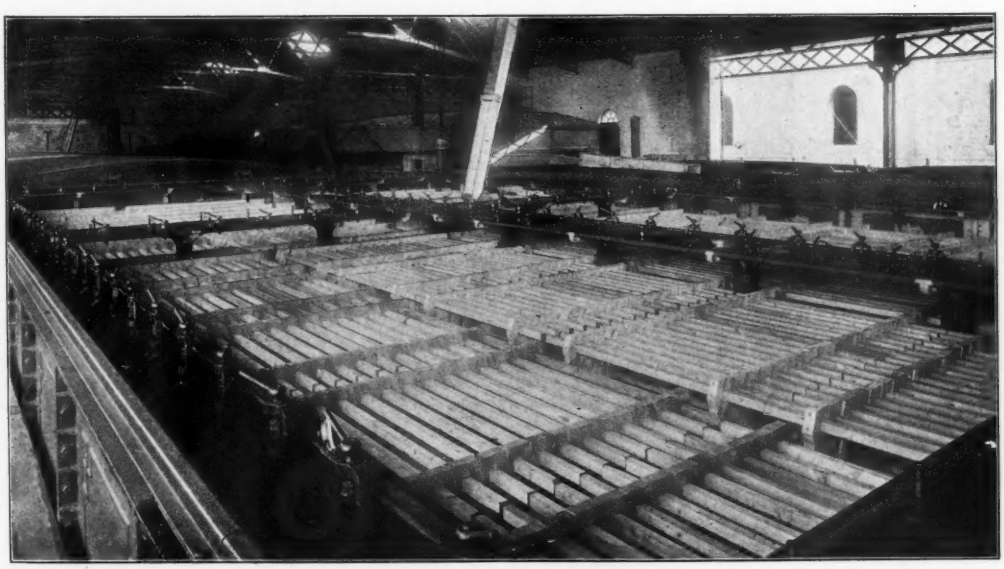
A Profit-Sharing Scheme.

As from July 1 of this year, a co-partnership scheme has been introduced for the benefit of the employees; and here, as elsewhere, the system has been found to work well, by giving an already loyal body of workmen a still greater incentive to do all that is possible in the best interests of the Company. On the date named every man who was admitted to co-partnership received twelve months' bonus as a nest-egg. A succession of four dinners was arranged for different sections of the men; and at each of these the Chairman expounded the scheme, which is based on broad lines. At the present ordinary price of gas—2s. 7d. per 1000 cubic feet—a man receives 4 per cent. on his wages, with 1 per cent. additional for every penny reduction below this figure. The money is to be placed in the hands of three Trustees—the elections of Officers, Committee, and Trustees all being conducted by the workmen. The men, of course, were bound to invest the nest-egg; and the Company also give them the option of banking their savings. To the latter suggestion, it is pleasing to note, there has been a very good response. Many men are paying in their money regularly, and saving up in order to qualify as shareholders. By their 1906 Act, the smallest shareholding in the Company is limited to £10; and till the necessary sum is reached, the Company hold the money, and pay the men 4 per cent. interest on it. This applies both to the share of profits and to other savings. The latter can be withdrawn at any time; and, by consent of the Committee, a man can also withdraw his bonus, though for this he must advance a good reason—such as illness, or demands on his pocket of an urgent and unforeseen character. The Company have not admitted anything like the whole of the men to participation in the scheme. In fact, they have selected none except those who are old and tried servants of at least five years' standing; but there is no reason why every man should not join ultimately—and, indeed, the hope is that in time every man will be found working hand in hand with the Company to forward the interests of the business. Any of those now outside who wish to take part in the scheme will be selected by the officers, who will have their decision confirmed by the Board. But they do not get the nest-egg. The object of arranging the scheme on these lines is to reward meritorious service; the idea being that if every man was at once included, there would not be the same incentive to special endeavour. Some particulars with regard to the scheme were given in the "Journal" for March 30 last (p. 929).

There is also the suggestion-box to which the Chairman referred at the lunch. This, by inviting from the men suggested improvements in apparatus or working, and offering rewards for valuable ideas, may almost be regarded as a form of partnership in management. At any rate, inviting the co-operation of the men in this way is a plan which has answered well elsewhere, as no doubt it will do also at Cardiff.

The Training of Boys.

The profit-sharing scheme, however, good as it undoubtedly is, does not by any means constitute all the Company are doing for the benefit of their employees. Another thing that may be mentioned is the desire to make the training of the gas-fitters' boys theoretical as well as practical, and give them a thorough grounding in everything. Mr. Clarry, with others, finds that very much more is required from a gas company nowadays than was the case in former times; and it is necessary for employees to have some knowledge of the science of gas and air mixtures, &c. The best time to teach them, of course, is when they are young. Then there is the question of hot-water circulators. These are now extensively used; and it is necessary to have plumbers to deal with them. Therefore the men have to be more than mere gas-fitters. Having realized this, and found that there was some difficulty with the local technical school, Mr. Clarry "took the bull by the horns,"



The "Hurdle" Grids in the Purifiers.

and started classes which are now satisfactorily running, on much the same lines as have been adopted by the Gaslight and Coke Company. They are, as he admits, following a very good lead. Each boy undergoes a course of training; and he attends in the Company's time at the bench and at the class, under a well-qualified teacher, who allows him to use tools when advisable, and sees that he does things in the right way. The Directors have examined specimens of the work of boys who have only been employed seven months; and they are highly delighted with the enthusiasm the lads show in this departure from ordinary routine. The Company have hopes that they will be able to keep the boys on themselves, and train them right through, independently of any other schools. The Board will see that any boy who wishes to go to the college, and cannot afford the necessary fees for his training, receives proper support, though up to the present no boy has applied for these facilities. To any who go there and satisfy the examiners, prizes will be given which will well reward them for their efforts. As being an additional incentive to perseverance, it may be remarked that the Company make it a rule subsequently to take into their regular employ apprentices who prove attentive to their duties.

Changes at Bute Terrace.

Until some eighteen months or two years ago, there was a stand-by manufacturing plant at the old works which adjoin the Company's offices in Bute Terrace; but the policy of concentration adopted, has led to gas-making facilities being confined solely to Grangetown. This involved the dismantling of the old retort-house at Bute Terrace; and the building is now being converted into a huge store—to permit of the concentration, also, of this branch. All the buckstave work of the house has been utilized to form balconies round the store; and the roof has, of course, been made water-tight. With these alterations, and a projected lift to raise the material as required, the building, with the walls nicely whitened, makes an ideal store. Bute Terrace, however, still remains a distributing station; there being left a holder and two governors. There is a somewhat similar station at Taff's Well, too, where there are two holders, pumping plant, and governors. This is in addition to five holders at Grangetown.

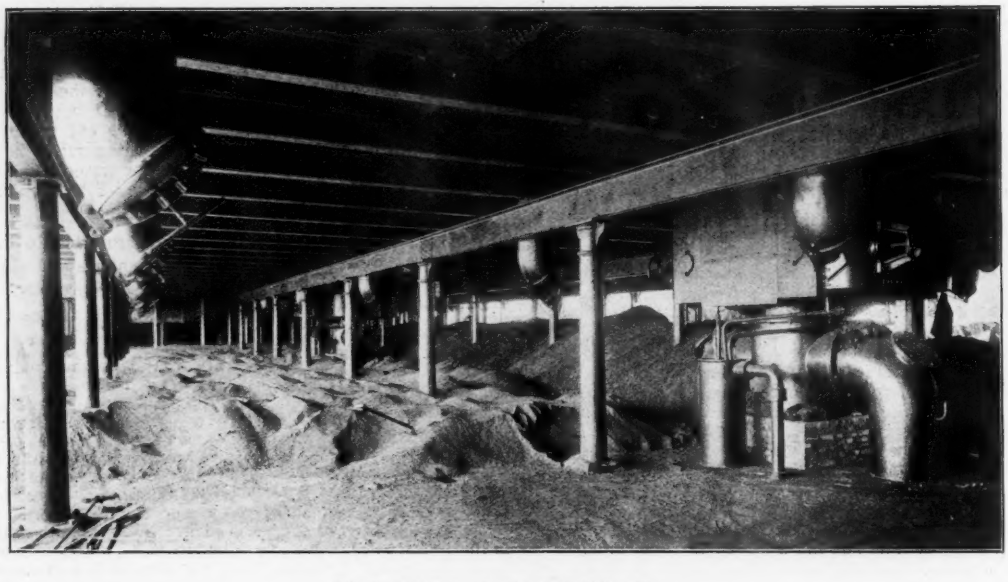
Before leaving Bute Terrace, one other sign of kindly feeling on the part of the Company towards the employees should be noted. Arrangements are made for the whole of the indoor staff, numbering over forty, to dine on the premises, where the cooking and everything is carried out. The mess is worked by a committee of the staff; the part of the Company being to provide the room, furniture, crockery, and so on. On a self-supporting basis, it is found possible to supply a three-course meal—soup, joint, and sweet—at 6d. a head. In affording facilities for dining in this way, the Directors are conferring a very great benefit, especially on the younger members of the staff.

AT THE GAS-WORKS.

On arrival at the gas-works, the party at once proceeded to the new purifying plant, where the ceremony of turning on the gas, as duly recorded later in this article, was carried out. An inspection of the works generally was then made, before the return to Bute Terrace to lunch.

Heavier Charges.

Just at the present time the make is about 4 million cubic feet per day; but the maximum output has risen to as much as 5½ millions. All the coal gas is made in one house, containing 20-feet retorts operated by West's compressed air machinery; and there are in use in addition two sets of Cutler's carburetted water-



The Centre Valve in the Revivifying Floor.

gas plant, each having a capacity of 1 million cubic feet per day. A feature of this plant is the provision of a third generator, so arranged that it can, in case of breakdown, be used with either of the two units. A point with regard to the Sturtevant blowers is that they are operated by two sets of direct-driven turbines. The carburetted water-gas plant is kept in regular use—a constant moderate percentage being added to the coal gas; and the mixture takes place at the outlet of the station-meter. Returning to the coal-gas plant, it may be remarked that Peebles' retort-house governors were fitted some eighteen months ago; and the experience of these is that they have led to a reduction in the number of stopped pipes.

Additional interest was imparted into the visit to the retort-house, by the information that the Engineer is experimenting with heavier charges than were formerly employed. Instead of 7¾ cwt. charges of six hours' duration, from 9½ to 10 cwt. at a time is now being placed in each retort, and left for a period of eight hours. It is, of course, early yet to speak of results of this new arrangement; but so far it seems to have been satisfactory. The improvement in the make has been slight; but better tar and better coke have been obtained. A bench of fourteen beds was renewed early this year. Of these, seven beds have done nothing but work on the heavy charges; and with them, it is interesting to note, there have been no stopped pipes at all. At present, Lancashire unscreened coal is being used; and the make per ton averages 10,500 cubic feet. The extremely level charges in the retorts were much commented upon; and the heats were very good.

Some Other Points.

While walking round the works, the attention of the party was with pardonable pride drawn to some excellent specimens of flowers grown on the works, and also to the Air Rifle Club Challenge Cup presented by the late Chairman (Mr. C. H. Williams) and the Edgar Pritchard Base Ball Challenge Cup, which the Works Club hold against all-comers.

The meter-house, of which a formal inspection was made, contains three large station meters, two of which have recently replaced smaller types. The measuring capacity of the three meters—one of which is used for the carburetted water gas, and the others for the coal gas—is equal to 10 million cubic feet a day. The capacity of the two new Laidlaw meters is 180,000 cubic feet per hour each. The exhausters, which were also visited, are of a total capacity of 9 million cubic feet per day; there being three double sets of Waller's four-blade type, each passing 3 million feet.

New Offices.

Near the entrance to the works, there is a substantially built set of offices, which have been recently erected by the Company's own workmen—the first really big job that has been undertaken in this way. The object of these offices is to transfer the Engineer's department entirely to the works; and it is therefore another development of the policy of concentration. The building consists of two floors, the whole of the top one being occupied by a drawing office, having extensive roof lighting, fitted with Mellows' patent glass, which has a pleasing, softening effect. Below there are the Engineer's office, clerk's office, and weigh-bridge house. By the way, this was not the only specimen—though the largest—of the constructional work of the Company's men that was to be seen; for the party were also able to inspect a coke-screening hopper now being made on the spot.

Still further evidence of the endeavour to concentrate wherever possible is to be noted in the conversion (now in progress) of an old Grangetown retort-house into an extensive platers', joiners', and carpenters' shop.

Coke—and Smokeless Fuel.

In the course of the luncheon, the Chairman referred to the fact that there were on the table and in the fire samples of a smokeless fuel—or partly carbonized coal—made at the Company's works. A commencement has not yet been made with the sale of this; but the Company, as soon as there is sufficient demand for it—and, of course, if they feel confidently assured that it will not injure their ordinary coke traffic—are quite in a position to market a material which they are certain will be as good for use in open grates as any of the other kinds of smokeless fuel to which special names have been given. In the ordinary way, the Cardiff Company are blessed with a very good demand for coke, and last Wednesday had only a few tons in stock. In fact, until a week previous, they were cleared out every morning by 10 o'clock—and all was taken by retailers in small quantities. They are, it may be noted, obtaining the satisfactory figure of 15s. a ton at the works.

The New Purifying Plant.

After the party had been photographed on the stage of the new house, by a workman in the employ of the Company (who, by the way, is responsible for the excellent illustrations of the plant which accompany this article), a move was made to the valve, on the discharge floor under the purifiers, by means of which the Chairman was to turn the gas into the purifiers. On reaching this,

Mr. F. Templer Depree remarked that it was his privilege, as the Chairman of the Company who had been erecting the plant, to ask the Chairman of the Gas Company to be good enough to turn the gas into the purifiers; and it had occurred to his co-Directors and himself that Dr. Taylor might accept a small memento of the occasion. The souvenir was a silver wheel which was connected to the valve by which he would ask the Chairman to turn on the gas. He believed that in these purifiers the Company would have the most up-to-date thing in the country; and by their aid they would be able to deal with a much larger quantity of gas than hitherto.

The Chairman, after turning the valve, remarked that the new purifiers only formed one of four sets; there being 24 boxes altogether on the works. Every effort was made to ensure the gas being pure, by means of frequent testing.

The silver wheel, when removed from the valve, had a table clock fitted into its centre. It bore the following inscription:

> With this wheel, the gas was turned into the new purifiers at the Grangetown Works of the Cardiff Gas Company, by the Chairman, Surgeon-Colonel William Taylor, M.D., J.P. 1909.

A Description.

The following description of the new plant, bound up with photographs, was handed to the visitors.

The new purifying apparatus is constructed on the most modern lines, with a view to the complete purification of the gas; and advantage has been taken of the utility of steel framing, which particularly lends itself to the class of building required for the housing of a purifying plant.

The building is divided into two sections: (1) The purifying-house proper, which contains the apparatus. This house is 153 feet long by 73 feet wide by 28 feet high to the eaves, and is formed of rolled steel joist stanchions braced together with two lines of lattice girders; the angles formed by the stanchions and girders being filled with ornamental brackets. The roof of the building is formed of 14 plated steel principals designed to provide a pathway for the broad band conveyor on the centre of the main tie-bar. The roof is battened with steel angles, covered with Duchess slates, and finished at the apex by a neat cast-iron ridge capping. A ventilator 12 ft. 6 in. wide runs up to the last principal, and is fitted with three tiers of louvre boards on each side. (2) The lime and oxide house, where the purifying material is stored and prepared ready for use. This house is 60 feet long by 73 feet wide by 20 feet high to the eaves, and is built of brickwork; the inner wall forming the end of the purifier-house. The roof and covering are similar to that on the purifier-house; but the end and division walls are finished with stone copings.

The new purifiers are six in number, four being 50 ft. by 30 ft. by 5 ft. deep, and two 40 ft. by 30 ft. by 5 ft. deep. The purifiers are constructed of cast-iron plates, ¾-inch thick, with outside flanges; and the side plates have a neat panel moulding cast on to them. Each purifier has four outlets for the spent oxide, with self-sealing mouthpieces on the underside.

The four larger purifiers have each four covers 22 ft. 6 in. by 12 ft. 6 in.; and the two smaller ones have each four covers 17 ft. 6 in. by 12 ft. 6 in. The covers are formed of ¼-inch thick steel plates, with strong angle curb, and are stiffened by steel bulb tees running the length way of the covers. The joints between the covers and the purifier top-plates are made with the "Green" type of patent rubber joint, bolted to the underside of the covers; and the covers are held down with swivels, bolts, and wing-nuts of special design, spaced about 20 inches apart.

The purifiers are fitted internally with Spencer's patent hurdle grids, which hold the purifying material very lightly, and allow the gas to be perfectly treated.

Two travelling cover-lifts of special design run the full length of the purifier-house on steel rails fixed to the top of the purifiers.

Around the boxes is a platform formed of red deal 6 feet wide, access to which is gained by two steel staircases.

The foundations are composed of concrete built from the gravel which was found at a depth of 18 feet. A superstructure of rolled steel joist girders and longitudinal joists carried on cast-iron columns—resting on the concrete foundations—supports the purifiers.

The purifiers are worked by means of two Pickering patent centre-valves, one of which controls the four larger boxes; the other controlling the two smaller ones. These valves are entirely connectionless, being bolted to the underside of the purifiers, and are capable of working any combination of boxes in rotation. The gas is brought to the Pickering valves by means of a 24-inch main from the scrubbers.

The plant for handling the purifying material consists of a bucket-elevator; the boot of same being in the oxide house and the head in the purifier-house. This elevator delivers the material on to a band-conveyor 24 inches wide, which carries it to any desired point by means of a throw-off carriage. Mechanical power is supplied by a 15 B.H.P. vertical "Colonial" type steam-engine to the elevating and conveying plant, which can deal with about 30 tons of material per hour.

The Chairman and Directors of the Company in providing this apparatus for the needs of their Grangetown Works have—in view of the multifarious uses and application of gas for light, heat, and power in the city—made every provision to ensure the supply being effectively manufactured and thoroughly purified, and have availed themselves of the latest improvements which are best adapted to the carrying out of these processes.

Messrs. John Aird and Sons, Limited, of London, carried out the foundations and the brickwork; and Messrs. Willey and Co., Limited, of Exeter, were the Contractors for the purifying plant, together with the steel and iron work of the building.

To this it must be added that the new plant was the subject of many complimentary remarks on the part of the visitors. The new purifying house is a continuation of a closed-in one of the same size, also containing six purifiers; but the more modern form of the new plant enables the boxes to cover a so much greater area that, while the capacity of the old house is about 2½ million cubic feet per day, that of the new purifiers is 4 million feet. These additional six boxes, it may be stated, bring the total purifying capacity of the works up to about 8½ million cubic feet per 24 hours.

At the close of the inspection, the party returned to Bute Terrace, and in the Board Room there were entertained at luncheon by the Chairman and Directors. Dr. Taylor presided; and on his right hand sat the Lord Mayor of Cardiff. In the course of the proceedings, some interesting speeches were made.

The Chairman, after the Loyal Toast had been honoured, proposed "Success to the New Purifying Plant." He expressed the hope that those present were satisfied with what they had seen at the Grangetown Works. The aim of the Directors was to supply the public with as pure an article as it was possible to send out. He had the pleasure of welcoming among them that day the Lord Mayor of Cardiff; and from what he knew of him, he was quite sure that at the end of his year of office he would have reflected credit on himself and on the city. Referring to general matters, he pointed out the importance of the residual products to a gas undertaking. Altogether, he said, there were about 150 known commercial products derived from coal tar. Many of them had doubtless heard from time to time about what was called "Coalite," which had been very much boomed by those who wished other people to take an interest in it. "Coalite," of course, was really half carbonized coal; and their own Company could, if desired, supply a fuel of this character. In fact, there was some on the table in front of him, as well as upon the fire in the room. The advantage of using it in place of ordinary coal was that it gave off no smoke or dust. Gas was a never-failing source of light; but they could not say the same of electricity. It had, however, been claimed for the latter that it was more convenient because of the ease with which it could be switched on and off; but now it was possible to do the same with gas. [This was demonstrated by the lighting-up and turning-out of a handsome cluster of inverted burners in the centre of the Board-Room.] Perhaps they had observed in use at different times electric fans for clearing the air. Well, they had now the same sort of thing operated by gas. [This also was illustrated by the turning on of a gas-fan.] In addition to the fuel to which he had already referred, he had in front of him some coal and some sulphate of ammonia. The latter article the Company did not at present manufacture; but he hoped that in time they would do so. Mixed with certain other substances, it gave one of the very best manures imaginable. He need not point out the various uses to which gas could be applied; but he would just like to say that for street lighting purposes in Cardiff comparisons were very favourable to gas—it was cheaper than the electric light. The Cardiff Gas Company had now nearly 33,000 customers; and of these something like 12,000 used penny-in-the-slot meters. They found that the consumption of the latter came out at about 15,000 cubic feet a year per meter; and last year their collectors brought into the office over 62 tons of coppers. The output of gas was increasing most satisfactorily. In 1904, they sent out 834 million cubic feet; while last year the quantity was 1145 millions—or an increase in this short period of 33¼ per cent. They had in their staff a set of officers who did everything possible in the interests of the Company; and they had also an excellent body of employees generally. During the past year, the Board had endeavoured to encourage the men by starting a profit-sharing scheme; and this had already proved an immense advantage. It meant an increase of pay to the employees; but, on the other hand, it led to them saving all they possibly could in the way of materials they had to use, and it also induced them to see that no man shirked his fair share of work. In many other ways, too, the Company had provided for the comfort and welfare of their men. In conclusion, he

coupled with the toast the name of Mr. Depree, the Chairman of Messrs. Willey and Co., who had erected the new purifiers.

Mr. F. Templer Depree remarked that the Chairman had drawn attention to the fact that there were at the present time something like 12,000 slot-meters in use; and that the consumption through them averaged 15,000 cubic feet per meter. This, he might say, was a very high average. For something like forty years it had been the privilege of Messrs. Willey and Co. to supply the Cardiff Gas Company with meters, &c.; and they regarded the fact of being entrusted with large extension work like these new purifiers as a great additional proof of confidence in them. He took credit for the fact that in the West of England they were able to turn out work equal to any other firm of the kind in the country. It was, however, impossible for contractors to carry out a job in the best possible way if they were not assisted by the permanent staff of the undertaking for which they were working. His firm had had from the first the utmost help, not only from Mr. Clarry, but also from Mr. Madden and every other member of the staff.

Mr. E. W. M. Corbett, J.P., proposed "The Corporation of Cardiff," coupled with the name of the Lord Mayor. The Corporation, he said, had done for Cardiff many great, and lasting, and praiseworthy things. The foresight of the men who provided the city with water from the Breconshire Hills was one matter which they could never be too grateful for. But, as ratepayers, they had not the same reason to be thankful that the gas-works were not purchased when there was a very good opportunity of doing so. As ratepayers, he believed they were suffering for this neglect to purchase; but as gas consumers he did not know that they were, because he did not believe that if the undertaking had been in the hands of any public body there would have been shown the same enterprise as they had seen in the case of the Cardiff Gas Company, and he did not believe that the people would have been so well supplied.

The Lord Mayor, in response, said that, speaking as a member of the City Council, there was a bitter regret in his heart that the Corporation had been silly enough not to purchase the gas-works at the time to which the previous speaker had referred. He thought, even at the price they would have had to pay, the undertaking would have worked out its own salvation. The Corporation recognized that the existence of a gas-works was quite necessary to a town; and though they had bartered and bargained with the Company, he was pleased to say they were getting on together in the most pleasant manner. When the last Bill was promoted, the parties met, and the matter was settled without any trouble.

Colonel H. Oakden Fisher, the Deputy-Chairman of the Company, proposed "Our Guests," and said he hoped that, from what they had just seen, they would still continue to have confidence in the Company. The Directors believed they were doing the best for the shareholders and the gas consumers; and he hoped this would always prove to be the case.

Mr. J. W. Botsford replied to the toast.

The Lord Mayor proposed "The Chairman and Directors of the Cardiff Gas Company." He said he was an old employee of the Company, to whom he owed a great deal. Many years ago he entered Cardiff as a stranger; and the first regular employment he obtained was at the Grangetown Gas-Works. He well remembered the old plant in existence then; and it was a surprise to him to see the vast changes that had since taken place. A great amount of energy and brain-work had been put into the manufacture of gas; and the labour and capital that had been involved was immense. In going round the works that day, he had been very pleased to see a number of men still there with whom he worked side by side when he was in the employ of the Company. It spoke well for the character of employers when they could so long retain the services of their men. He was also glad to notice the introduction of the co-partnership principle, in which he had the very greatest faith. There was nothing that would contribute so much to the success of an undertaking as a body of employees well satisfied with their conditions.

The Chairman, in returning thanks, referred to the remarks of Mr. Depree, and said it was quite true his firm had been connected with the Gas Company for very many years. In addition to this, some time ago, when they were thinking of introducing slot-meters, it became (in the absence of the then Chairman) his duty, with Mr. Morley, who was at that time Engineer, and Mr. Clarry, to receive samples of the different kinds of coin-meters; and, among others, they had one from Messrs. Willey and Co., which seemed to them one of the best. They visited Exeter, and finally selected Messrs. Willey's meter, with which from that time to this they had been supplied. They had been satisfied with the firm's meters; and he trusted they would be equally satisfied with the new purifiers. The Lord Mayor had referred to the time when there was an opportunity for the Corporation to buy the gas-works. Well, as a ratepayer, he (the speaker) might feel it was a mistake they did not do so; but as a Director of the Gas Company he was glad things had remained as they were. He would be only too glad if at the present moment they could see their way to cheapen the cost of gas in Cardiff. In 1906, the Corporation opposed their Bill; but they were able to arrange terms. The price of gas was then 2s. 9d. per 1000 cubic feet; and the Corporation insisted on a reduction of 1d. then, and a similar concession in 1907. This brought the charge to 2s. 7d. If they were called upon now to make a reduction of 1d. per 1000 feet, it would cost them £4500 per annum. This they could not at present afford; but the employees would not be satisfied until they had got the price down to 2s. 6d., because they themselves would benefit to a certain extent. Under the profit-sharing scheme, they were paying the men 4 per cent. on their earnings, at a price of 2s. 7d. per 1000 cubic feet; but if the price were reduced to 2s. 6d., they would get 5 per cent. Then there was also a "Suggestion" scheme in operation. If any man thought he could suggest an improvement in the manufacture of gas, or in any other direction of interest to the Company, he could write it down and deposit it in a box on the works, which would be opened periodically. If on examination the suggestion was found to be an improvement, the man would get a prize—perhaps a valuable one.

Mr. C. St. D. Spencer proposed "The Permanent Staff," coupled with the names of Mr. Clarry and Mr. Madden, of whom he spoke in terms of warm appreciation. For something like thirty years, he said, Mr. Clarry had worked morning, noon, and night in the interests of the Company. He did not think any company could be better served than they were by these two gentlemen. But he felt they could not do what they did unless those below them were performing equally good work in their various departments.

Mr. George Clarry, in responding, remarked on the changes he had witnessed in the Company. A rise from 8000 to something like 33,000 consumers was a big jump; but the progress had been so steady and so sure that there had been no possibility of thought of ever turning back. Their interest was to serve the consumers with a good article as cheaply as possible. They had a very loyal staff; and the co-partnership scheme had welded everybody together to serve the interests of the consumers. The only persons left, as it were, out in the cold were the shareholders. They did not seem to benefit from the little improvements in labour-saving and other things; and this always struck him as being something of an anomaly.

Mr. H. D. Madden also replied, and said he had found under the co-partnership system the men had worked even more willingly than before; and this was saying a good deal. It was the earnest ambition of the workmen to give the Board the most loyal support, so that they might if possible reduce the price of gas, and at any rate give Cardiff a thoroughly efficient supply.

This brought the pleasant and successful day's proceedings to a close.

THE DISTRIBUTION OF GAS.

We have received from Messrs. John Allan and Co., of Bouverie Street, E.C., a copy of the second edition of "The Distribution of Gas," by Mr. Walter Hole (Superintendent of the City of Leeds Gas-Mains and Distribution Department, and Lecturer on Gas Distribution at the University of Leeds), the first edition of which was, on its appearance somewhat over two years ago, reviewed at length in our columns. In a prefatorial note, the author remarks that advantage has been taken of the demand for a second edition to revise, bring up to date, and considerably extend the scope and purpose of the work.

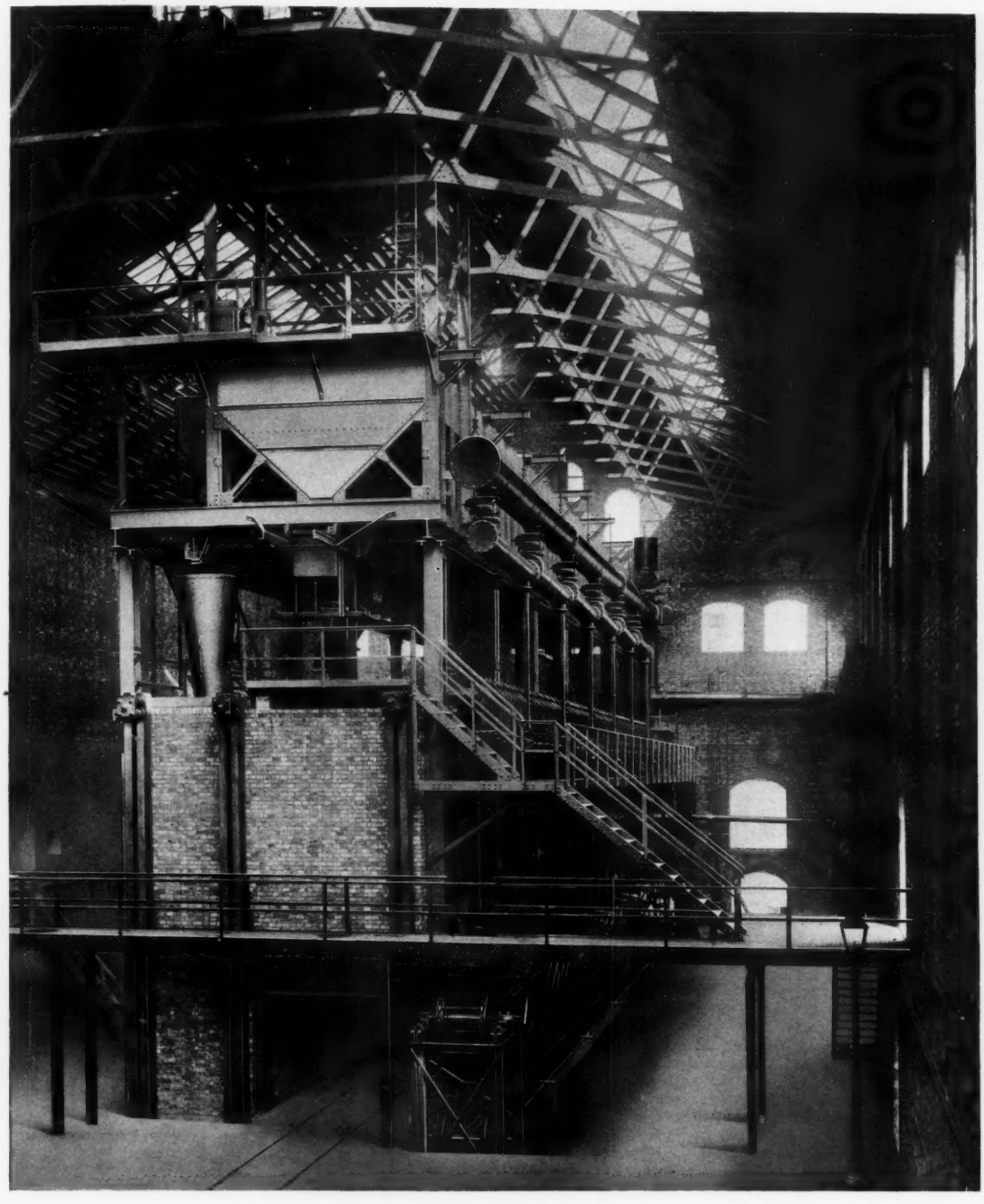
In carrying out the last-named idea, seven new chapters have been added, dealing with the principal aspects of supply and consumption of gas upon the consumer's premises—*i.e.*, meters, internal pipes, fittings, and lighting, and gas fires, cookers, and engines. There are also over a hundred additional illustrations. On the other hand, in order to keep the size of the book within manageable proportions, it has been found necessary to compress certain portions of the matter as first published. Even thus, however, the book extends to nearly 850 pages. The 33 chapters contain about 650 illustrations; and there is a useful index. Heavily gilt, and neatly bound, Mr. Hole's "Distribution of Gas" (the price of which, it may be remarked, is fixed at 15s. net) will be an ornament to any bookshelf; but the weight of the paper used, while excellent from the point of view of the illustrations, makes it perhaps just a trifle heavy for holding in the hand. The contents of the book constitute a valuable contribution to a subject the importance of which is daily becoming more emphasized; and the profuseness of the illustrations is also an excellent feature, which deserves recognition. The author is to be congratulated upon the fact that a second edition of the work has so soon been called for; but this is a matter which need occasion no surprise, when one considers the subject of which it treats, and Mr. Hole's qualifications to deal with this subject.

Winter Meeting of the Association of Water Engineers.

This meeting will be held in the rooms of the Geological Society, Burlington House, on the 10th and 11th prox., under the presidency of Mr. R. Askwith, M.Inst.C.E., Engineer of the Weardale and Consett Water Company. We learn from the programme issued by the Secretary (Mr. Percy Griffith) that the proceedings will be opened at two o'clock on the first-named day, when the paper on "Public Water Supply for Fire Extinguishing," presented by Mr. C. W. S. Oldham, of Ipswich, at the summer meeting, will be discussed. This will be followed by the reading and discussion of papers, of which four have been promised—viz., "Reservoir Outlets," by Mr. G. N. Yourdi; "Evaporation from Water Surfaces," by Mr. S. R. Lowcock; "A Sterile Boring in the Inferior Oolite (Somersetshire)," by Mr. W. Phelps; and "Ferro-Concrete as Applied to Water-Works Construction," by Mr. H. W. Taylor. On the morning of the second day, ballots will be taken for the election of the Council and officers for the year 1910-11, and also for new members, after which the remaining technical business will be disposed of. A discussion will follow on "The Control of the Accounts of Municipal Water Authorities," to be opened by Mr. E. Antony Lees, the Secretary of the Birmingham Corporation Water Department; and the meeting will close at half-past one.

The London and Southern District Junior Gas Association will meet at the Cripplegate Institute on Friday next, when Mr. W. Wright, of the Tottenham and Edmonton Gas Company, will read a paper on "Cleaning Gas-Cookers by a New Process." This will be followed by a series of lantern slides on the gas industry. The Association will visit the Tottenham Gas-Works on Saturday, the 4th prox.

THE DESSAU VERTICAL RETORT INSTALLATION AT SUNDERLAND.



THE DESSAU VERTICAL RETORTS AT SUNDERLAND.

It will be remembered that in the "JOURNAL" for July 6 (p. 25) we were able to give a detailed description of the first installation of Dessau vertical retorts in England, which were then in course of construction at the Ayres Quay (Sunderland) Gas-Works. The first of the three photographs reproduced showed the bench in its then incomplete state; and it is now possible to supplement that by the accompanying photograph of the finished retorts. The installation, it may be remarked, consists of six beds of ten 4-metre retorts; and arrangements are being made to start work with it next Monday.

German Chemical Industry.—The Engineering Supplement to "The Times" last Wednesday contained a long article on this subject; and the following reference was made to it in one of the editorial notes: "In a vague manner, it has long been the custom to admit that in certain chemical industries, and particularly in those relating to coal-tar products, this country is behind Germany. But when this undefined admission is replaced by exact knowledge of the extent of the German undertakings that have developed from discoveries originating in England, we may well pause in wonder, and inquire further into the cause. A correspondent puts forward figures of a surprising character, which indicate that the annual German exports of aniline and allied substances must be valued at about seven millions sterling, corresponding to the employment of many thousands of workpeople. To this number must, of course, be added those engaged upon producing the machinery and other equipment necessary for the various processes. His clear and impressive statement of the conditions that have alienated from us much of this business is complete in itself; and it calls for little accentuation, except, perhaps, in so far as concerns the difference between an industry in which the workers are 'engaged the whole year through at full pressure' and an industry in which output is spasmodic. It is the unsteadiness of labour in this country, as much as its average decline, that constitutes the difficulty and the bitterness of the problem of unemployment. . . . Every effort should be directed towards encouraging chemical industries that provide steady work."

COAL STATISTICS FOR 1908.

A Decreased Output.

GREAT interest always attaches to statistics relating to that priceless national asset coal; and so a ready welcome annually awaits Part III. of the Home Office Report on Mines and Quarries, which gives full particulars with regard to the output and value of the minerals raised in the United Kingdom, the amount and value of the metals produced, and the exports and imports of minerals. A fortnight ago, the statistics for 1908 were published. Compared with its immediate predecessors, the year dealt with was not altogether satisfactory so far as coal is concerned; for, in place of the increases to which one has become accustomed, there falls on the present occasion to be recorded a decrease both in quantity and value of the output. It may, however, be remarked that the falling off, though substantial enough when considered by itself, loses much of its seeming importance when taken in conjunction with the heavy increases that have been experienced of late years.

The total quantity of coal raised in 1908 was 261,528,795 tons, of a value at the mines and quarries of £116,598,848—the figures for 1907 being 267,830,962 tons, of a value of £120,527,378; for 1906, 251,067,628 tons, of a value of £91,529,266; and for 1905, 236,128,936 tons, of a value of £82,038,553. Thus there was a decrease last year as compared with 1907 of 6,302,167 tons in the output, and of £3,928,530 in the value. These decreases in output and value are not exactly proportional to each other, it may be pointed out, inasmuch as the average price of coal was 8s. 11d. per ton in 1908, as against 9s. in 1907. The value of the coal at the mines for each of the past five years has been: In 1904, 7s. 2·58d. per ton; in 1905, 6s. 11·38d.; in 1906, 7s. 3·49d.; in 1907, 9s.; and in 1908, 8s. 11d. Thus, in the period named 1907 was the only year in which the price realized averaged more than in the twelve months now under review; while exactly the same remark applies to the output.

As regards the decrease of 6,302,167 tons in the output last year, the major portion of the falling off was naturally borne by England, whose total output annually is more than twice as much as that of Wales, Scotland, and Ireland combined. The output in England in 1908 was 181,709,283 tons, of a value of £79,160,339; in Wales, 40,558,129 tons, of a value of £22,295,026; of Scotland, 39,158,225 tons, of a value of £15,087,819; and of Ireland, 103,158 tons, of a value of £55,664. Compared with the preceding twelve months, these outputs show, in the case of England a falling off of 5,677,234 tons, in that of Wales a gain of 305,936 tons, for Scotland a decrease of 934,323 tons, and for Ireland an addition of 3454 tons. As usual, the term "coal" in these statistics includes anthracite, the total output of which in 1908 was 4,080,460 tons, of a value of £2,286,630. This item shows an increase in amount but a decrease in value as compared with the previous year, when the output was 3,850,437 tons, and the value £2,308,259. Of the total supply of anthracite, 3,089,576 tons, or 75 per cent., came from Carmarthen and Glamorgan; but the output in Brecon, also, was 590,567 tons. Pembroke supplied a small quantity—50,931 tons; and of the remainder, 268,382 tons are credited to Scotland, and 81,004 tons to Ireland.

As to the prices of coal per ton at the pit's mouth in the different fields, it may be stated that in 1908 these were as follows: In the Scotch coalfields, 7s. 8·47d. per ton; the Northern coalfield, 8s. 8 28d.; Yorkshire, &c., 8s. 3·78d.; Lancashire and Cheshire, 9s. 0·90d.; Midland coalfields, 8s. 2·89d.; small detached coalfields, 9s. 5·79d.; North Wales, 8s. 4·72d.; South Wales, 11s. 0·74d.; and the Irish coalfields, 10s. 9·5d. The average price per ton at the pit's mouth was for England 8s. 8·56d. per ton; for Wales, 10s. 11·93d.; for Scotland, 7s. 8·47d.; and for Ireland, 10s. 9·5d.; while, as already stated, over the whole of the fields it was 8s. 11d. per ton. The average price in the London market was 17s. 6d. per ton in 1908, as compared with 19s. 9d. per ton in 1907, 15s. 9d. in 1906, 15s. 6d. in 1905, 15s. in 1904, 15s. 10d. in 1903, 18s. 1d. in 1902, 19s. 5d. in 1901, and 22s. 9d. in 1900.

The quantity of coal exported (exclusive of coke and patent fuel, and of coal shipped for use by steamers engaged in foreign trade) was 62,547,175 tons, as compared with 63,600,947 tons in the preceding year, when the amount showed an increase of more than 8 million tons over 1906—the figure for that year being 55,599,771 tons. In 1905, the exports were 47,476,707 tons; and in 1904, 46,255,547 tons. The declared value of last year's exports of coal was £39,546,169, and of those of the preceding year £40,170,296. In addition to this, there was in 1908 the equivalent of 1,988,393 tons of coal exported in the form of 1,193,036 tons of coke, and of 1,296,394 tons in the shape of 1,440,438 tons of patent fuel. If to this be added the 19,474,174 tons of coal shipped for the use of steamers engaged in foreign trade, there is arrived at a total quantity of coal and coal equivalent shipped of 85,306,136 tons. The declared value of the exports of coke was £955,432, and of patent fuel £1,114,322. It may be pointed out that the coal equivalents are ascertained by assuming that for every 60 tons of coke exported, 100 tons of coal were consumed in its manufacture. The patent fuel exported is computed to contain 90 per cent. of coal; the remaining 10 per cent. consisting mainly of pitch. It is interesting to glance at the list of countries to which this enormous quantity of coal was exported last year. Our three largest customers remain the same; and they occupy the same relative positions as for the previous twelve months. France took 10,415,430 tons of coal, of a value of £6,257,652; Germany, 9,646,868 tons, of a value of £5,234,408; and Italy, 8,742,634 tons, of a value of £5,650,302. These figures are for coal alone; but in the case of France and Italy, they would be increased by over 200,000 tons by the addition of the coke and patent fuel. The coal, as such, exported to these three countries in the three preceding years was as follows: 1907—France, 10,694,136 tons; Germany, 10,107,877 tons; and Italy, 8,317,637 tons. 1906—France, 9,444,528 tons; Italy, 7,810,024 tons; and Germany, 7,629,653 tons. 1905—Germany, 7,626,377 tons; France, 6,731,655 tons; and Italy, 6,412,686 tons.

Thus, though on the present occasion there is some slight decrease in the case of both France and Germany, the large growth which has taken place of recent years must be regarded as having been fairly maintained. Imports of "coal, culm, and cinders" into the United Kingdom—which are never of an extent which renders them worthy of a moment's consideration—are even smaller than usual in the statistics now under review. In 1908, the total quantity imported was 3842 tons, and the value £4689. For 1907, the tonnage was 18,834, and the value £20,845. Germany, with 1856 tons, was last year the largest contributor; while at the other end of the scale came Japan (including Formosa), with 15 tons. After meeting all the requirements from abroad there remained, of the total output of 261,528,795 tons of coal, 176,222,659 tons for home consumption for all purposes; and reckoning the population of the United Kingdom at 44,546,822, this represented a quantity of 3·956 tons per head—an amount which has only been exceeded (and then by very little) on five occasions since 1873, the date to which the statistics go back. In 1907, the amount remaining for home consumption per head of the population was 4·142 tons. There were used in blast-furnaces for the manufacture of pig iron 18,742,464 tons of coal, as against 21,119,547 tons in 1907.

Particulars in regard to the making of coke and briquettes, and the number of coking-ovens in use during the year 1908, show that returns of production of coke were received from 164 colliery owners (comprising 231 separate works), 1452 gas works, and 19 other owners of coke ovens (comprising twenty works). The counties of Durham and York furnished 68 per cent. of the total quantity of coke made in coking-ovens. Of the 251 works, other than gas-works, where coking plant is in use, bye-products were recovered last year at 69; the principal of these bye-products being sulphate of ammonia and tar. Returns as to the manufacture of briquettes were obtained from all firms known to be engaged in the industry; South Wales being by far the largest contributor in this respect. The report states that very fine slack, which would otherwise be of little value commercially, is used in making briquettes. The total quantity of coal used in the manufacture of coke in 1908 is given as 35,233,523 tons; the total amount of coke obtained being 18,537,468 tons (7,323,817 tons from gas-works, and 11,213,651 tons from coke-ovens), of a value of £12,467,287. Of the gas-works output, 6,252,529 tons came from England, 141,522 tons from Wales, 777,841 tons from Scotland, 142,045 tons from Ireland, and 9880 tons from the Isle of Man. Of the 26,214 coke-ovens in use, 19,478 were of the beehive pattern; the second and third in order being: Coppée 2198, and Simon-Carvès 1044. Of Otto Hilgenstocks there were 876, and of Semet-Solvays 760. Of briquettes there were produced 1,604,649 tons, valued at £1,175,652.

There are, of course, many other materials than coal dealt with in the report; and these may in conclusion be shortly touched upon. The output and value of the bog ore taken from open workings in Ireland last year shows a decrease on the preceding twelve months; the figures being: 1908, 4295 tons, of a value at the open works of £1074; and 1907, 6290 tons, value £1573. Going back to 1880, the year of greatest output was 1891—16,075 tons, value £8037. The output of iron ore last year was 15,031,025 tons, of a value of £3,724,165. This was 700,579 tons less than in the preceding twelve months. With regard to natural gas, the statement in the report is on very much the same lines as during the last few years: "Natural inflammable gas was discovered at Heathfield, in Sussex, some years ago, when a hole was being bored with the object of obtaining water. During the year 1904, the amount of natural gas obtained at Heathfield was 774,800 cubic feet, valued at £155; but none has been obtained since for commercial purposes. The railway station at Heathfield, however, is lighted by it; but the quantity is not ascertained." There has been no output of petroleum in the United Kingdom since 1906, when the amount was 10 tons; but, needless to say, the imports remain on the usual enormous scale. Last year, the imports were 343,613,048 gallons, of a value of £6,662,811, compared with 304,134,482 gallons, value £6,067,285, in 1907. The sources of supply were: Russia, 32,945,950 gallons; the United States, 245,739,336 gallons; and other countries, 64,927,762 gallons. The feature of these figures is the same as for the last few years—a falling off in the Russian supply, and a more than counterbalancing increase in the quantity derived from other sources—mainly the United States. In 1904, the imports from Russia amounted to no less than 129,599,066 gallons. The value of last year's imports was: From Russia, £708,682; from the United States, £4,537,110; from other countries, £1,417,019.

The Council of the Royal Society have, with the King's approval, awarded the Hughes Medal to Dr. R. T. Glazebrook, F.R.S., the Director of the National Physical Laboratory, for his researches on electrical standards.

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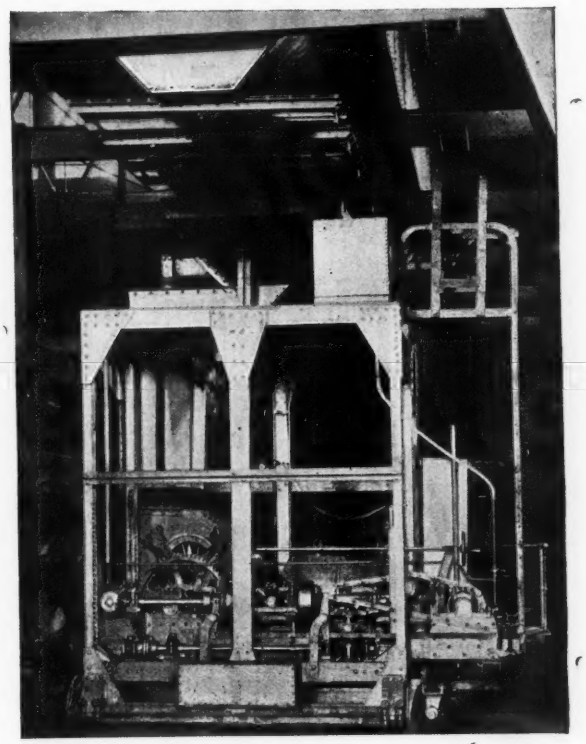

STIRLING RETORT-HOUSE.

See "JOURNAL," Aug. 3, 1909, Page 309.

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A GLANCE AT THE TECHNICAL DEVELOPMENT OF THE GAS INDUSTRY.

By Dr. W. von Oechelhaeuser, the General Manager of the German Continental Gas Company.

On Sept. 29, His Royal Highness, Prince Ludwig of Bavaria, presided at the Annual Meeting of the German Museum at Munich; and Dr. W. von Oechelhaeuser, the distinguished General Manager of the German Continental Gas Company, of Dessau, gave an address, which constituted a review of the technical development of the gas industry. The address has now been published in the "Journal für Gasbeleuchtung."

Dr. von Oechelhaeuser began by saying that the glance which he proposed to take in his address at the evolution of the technical side of the gas industry, could necessarily be only a fleeting one and of very restricted scope. The gas industry in its widest sense comprised not only coal-gas central works, but also the many individual installations in which oil, wood, petroleum, benzoline, acetylene, and mixtures of air and volatile hydrocarbons were the materials applied. Many of these branches of the gas industry really constituted distinct manufactures, such as the production of oil gas, which had been brought to a high state of development by the firm of Pintsch, the acetylene industry, and in former times, the manufacture of wood gas, which was at one time very prevalent in the south of Germany. The carbonization of coal represented a process of far-reaching character for perfecting fuel. On gas-works, the raw material, which could only be burned in the air with much evolution of soot and smoke, was, by dry distillation with the exclusion of air, made to yield products which burned without producing soot and smoke. The most valuable product, however, rendered possible the transport under the soil, in an easy and cheap manner, of energy in the gaseous form by means of a system of pipes extending to hundreds of miles in length. This distribution was effected under the quite small pressure of gas of about $\frac{1}{160}$th of an atmosphere—say, from 2 to 3 inches of water. The average loss in this transport of gas amounted to about 5 per cent.; and the gasholders formed ideal reservoirs competent to store nearly the whole consumption of a winter day. The gasholders constituted most valuable equalizers for the greatly fluctuating consumption, and thus admitted of the load on the retort-settings in which the gas was manufactured being kept uniform. Such a uniform load was quite as important in the working of furnaces as it was in engineering work where steam-engines, turbines, and motors of all kinds were now used. These great accumulators worked without any loss, as the pressure which was requisite for filling the gasholder was utilized again on its discharge. This unique and extremely valuable characteristic afforded a great advantage to the gas industry from the point of view of a central supply of energy.

The exhibits in the German Museum at Munich were next referred to by the speaker as affording a graphic history of the development of the gas industry in the past and as being very valuable from the historical standpoint. After a reference to the technical literature, in which the progress of the gas industry was chronicled, and to the good work done by the technical associations, such as the German Association of Gas and Water Engineers which has this year celebrated its Jubilee, mention was made of the instructional and experimental gas-works established by the Association at Carlsruhe. Passing on to the evolution of the technique of gas manufacture, the speaker put the development of retort-settings in the foreground. Classifying settings broadly according to the position of the retorts, he referred to the labour which was required for the service of each class. In the early decades of the life of the gas industry, all the settings had horizontal retorts, to which, in the seventies, regenerative firing was first applied.

The ever-increasing wages bill was combated by the introduction of mechanical appliances driven by steam, compressed air, hydraulic power, or electricity, and at the same time the oppressiveness of the manual labour was reduced. Then followed the introduction, through the French gas engineer, M. Coze, of retorts set at an angle of about 30°, which facilitated the automatic charging and discharging of the retorts. A few years ago, the Chief Chemist of the German Continental Gas Company had devised and perfected a system of vertical retorts, which Herr E. Körting, of Berlin, had been instrumental in introducing on a large scale and in many countries. The labour required with these retorts was about one-quarter of that necessary with horizontal retorts, and was of a considerably lighter character, so that the working of gas-works had been brought up to modern demands in the hygienic respect. Simultaneously almost with the introduction of the Dessau vertical retort, there had been devised by Herr Ries, the Manager of the Munich Gas-Works, a form of large chamber-ovens with sloping bottoms, in which coal was carbonized for the production of gas. Models of both these new carbonizing plants would shortly be placed in the German Museum. In England, an attempt had been made with the Woodall-Duckham system to effect the continuous carbonization of coal in retorts; but this fascinating principle had long since shed its charm for German technical men.

In contrast to the diversity of systems of settings and carbonizing processes, the purification of coal gas was effected at all gas-works on practically the same lines. It was rather in the perfecting of the construction of purifying plant than in fundamental innovations that progress had recently been made.

While Germany stood in the forefront in the technical development of the gas industry, especially in regard to systems of carbonization, it was nevertheless considerably behind England and America in the use of gas for lighting and heating. The magnitude of the operations in America might be indicated, for instance, by the size of the latest gasholder at the Astoria works, at New York, which was nearly three times that of the largest in Berlin. It was difficult to estimate the consumption per head of the population for America; but in England it was absolutely and relatively more than two-and-a-half times as great as in Germany. Yet even in Germany there had been a greater increase in the consumption of gas since the introduction of electric lighting than at any previous time.

This enormous consumption of "our Anglo-Saxon cousins" depended, on the one hand, on the possibility of manufacturing gas cheaply, and, on the other hand, on the more energetic introduction of automatic coin-freed gas-meters. Probably, however, their standard of life, which in all directions, especially with the middle classes, was more pretentious than in Germany, came into account in this matter. In the eighties and the early part of the nineties of the last century, America had taken up the manufacture and distribution of the cheaper water gas in place of coal gas; but in Germany this example had not been followed, because, owing to tariffs and the small native production, the petroleum requisite to raise the water gas to the necessary calorific standard could not be obtained cheaply enough. Special water-gas plant was used in Germany almost solely for the sake of its elasticity of output and the small ground area it demanded, as a supplement to existing coal-gas installations.

Reverting to the use of gas, it might be said that, whether for lighting, heating, or the development of power, it now depended on the most intimate preliminary mixture of the gas with air. Thus the highest attainable temperature was secured from the smallest possible quantity of gas. The great revolution in the development of light from gas was the work of the Vienna scientist Auer von Welsbach. But it should be remembered that the upright and inverted regenerative burners of Frederick Siemens and others constituted a great advance in economy and intensity on the earlier types of gas-burners. When the speaker first saw the incandescent light of Welsbach at the University laboratory at Vienna in 1885, it impressed him as an interesting, rather than a striking, exhibit. This, however, was the first type of the Welsbach light, which afforded a new and unfamiliar lighting effect, without a higher intensity or a greater economy than existing gas-burners. It was in 1891 that the intensity and economy were nearly quadrupled, and the new type of Welsbach light made its triumphant *début* to the world.

Dr. von Oechelhaeuser then proceeded to refer to the composition of the Welsbach mantle and the theories advanced to account for its lighting effect. Next he spoke of the inverted incandescent light, which, he said, required only a fifth the quantity of gas for the production of the same light as was necessary with the Welsbach burner of eighteen years ago. He passed on to refer to high-power and high-pressure gas-lamps, and to their application for public lighting. In concluding his remarks on gas as an illuminating agent, he mentioned that its lighting value now depended on its calorific power, and that the calorimeter which had thus superseded the photometer was, by comparison with the latter, an instrument of precision.

The lecturer did not attempt to deal exhaustively with gas as an agent for heating as distinct from lighting; but mentioning its general employment for heating and cooking, he spoke of the use of coal gas for heating purposes in industrial operations, ranging from the large scale hardening of armour plate, &c., at works such as those of Krupp, to the small-scale tempering of watch springs, &c. The multifarious uses of gas for heating were brought about, he said, through the ease with which the heat attained could be controlled—automatically, if need be—and the freedom of gaseous firing from smoke and soot.

The third principal use of gas—viz., for the development of power, was distinguished by the fact that poor gases, from blast-furnaces, coke-ovens, or special generators, were used instead of coal gas for the larger units. The limit of economical employment of coal gas was reached at 100 to 150 H.P. in one cylinder, and for higher powers the poorer gases were required. Experiments had led the lecturer to the conclusion that the economy of gas-engines—large sizes in particular—would be improved in the same manner as had the efficiency of the incandescent gaslight—viz., by a much more thorough preparatory admixture of the gas and primary air.

After referring briefly to the history of the origin and development of the gas-engine (his own share in the evolution of the large sizes of which Dr. von Oechelhaeuser omitted to mention), the speaker noticed the recent introduction of rapid-running engines of $\frac{1}{2}$ to 12 H.P. to consume coal gas, the design of which had been largely borrowed from the automobile industry.

The distribution of gas at high pressure to a great distance next came under notice. Then, by way of summarizing the general applicability and economy of gas, it was stated that a cubic metre (35 cubic feet) of it would yield either from 1000 to 2000 candle power, or 2 H.P., or 5200 calories (about 20,800 B.Th.U.) for an hour, according as light, power, or heat was demanded of it. Recently the German Continental Gas Company

had developed a process for the production on a working scale by the carbonization of coal of a gas of about 0·225 specific gravity, eminently suitable for filling balloons. [See "JOURNAL," Vol. CVIII., p. 180.] This latest application of coal gas indicated the peculiar and innate advantages which it possessed in virtue of its physical qualities, apart from its immense value as a fuel. Finally, the gas industry, aided by chemistry, should in the future, as in the past, play an important *rôle* in transforming and transporting the sources of energy which had been stored up in the bosom of mother earth from long spent ages and suns. Notwithstanding every industrial competitor, the gas industry would continue to move onward.

RICHMOND'S AUTOMATIC GAS-FLASHER.

CONSIDERABLE interest is being taken just now in the question of the use of gas for flash-signs. It is years ago now since attention was first drawn to some (for the period) excellent examples of the products of inventiveness in this direction. But they were somewhat cumbrous, and occasionally showed a little hesitancy in complying with the desideratum of regularity; and so they did not meet at the time with the success that was hoped for. But gas flash-signs have been vastly improved. Their action is easier, more constant, and they are subject to the nicest of regulation as to speed and to attractive variation. There is a field for them; and in their effects they can vie with electricity. Our columns have borne testimony to this; and gas engineers were, at the recent Southern Association meeting, giving their views on the question, and were looking at the field of the gas flash-sign as a promising one, and one that permits of great expansion. In America, the use of flashing advertisements has grown at remarkable pace; and electric signs have taken a hold in this country. But it has to be recognized that gas occupies a larger field in lighting than electricity; and therefore the scope for the introduction of illuminated advertising signs is a more extended one than that possessed by the competitor. The proof that electricity does not hold the monopoly of this business can readily, and in the most practical manner, be afforded nowadays—and the sooner the better in every district. No field for business should be allowed to be occupied unchallenged—more especially when, as in this case, the consumption of gas is not the only benefit for consideration, but such signs are a constant advertisement for gas.

The Richmond Gas-Flashing Apparatus.

The Richmond Gas Stove and Meter Company have, after much thought and experiment, developed a very simple and useful gas-flasher, originally with the view of advertising their "A. B. C." gas-fires, by mutual arrangement with gas authorities, at show-rooms and offices. Though its original designed purpose was limited, it has now been decided to launch out into general business in these signs. The operating apparatus is contained in the box-like structure shown in the illustration; the working medium being the ordinary gas pressure from the distributing mains. As we say, the apparatus (for which a patent has been applied for) is very simple, consisting of a diaphragm similar to that used in a gas-meter, with suitable chambers, passages, and tumbler balance-weight, enclosed in a tin case, with connections screwed for iron barrel. This apparatus flashes the incandescent light "on" and "off" with the greatest of regularity. By the adjustment of a lever, any required number of flashes may be effected, from (say) eight to twenty per minute, depending on the pressure of the gas, and the number of lights used. The apparatus does not rely on a motor or clockwork of any description; so that, when once started, it requires little attention, and can safely be left to work of its own accord. The character of the signs used—projecting or other forms—to which the apparatus can be applied has palpably unlimited range; and the flashers can also be designed to illuminate existing shop facias. Several signs can be made for the same box for changing day by day, or at other periods.

ILLUMINATING ENGINEERING SOCIETY.

THE Inaugural Meeting of the Society was held last Thursday in the famous hall of the Royal Society of Arts, under the first PRESIDENT (Professor Silvanus P. Thompson, D.Sc., F.R.S.). To those attending the meeting, the report of the Council and a list of the office-bearers and members were handed. From the latter, it is seen that gas has not a big numerical representation; the electrical element in the composition far outweighing the representation of coal gas, air gas, acetylene, and oil. The list of office-bearers and members is an imposing one for a new society; but it is remarked that several of the Vice-Presidents and members are drawn from the Continent and America. Of twenty-five Vice-Presidents, only seven are of this country. We see among them the names of Bunte, Crookes, Drehschmidt, Elliott, and Lewes; and several others high in the scientific world. The Council is composed of nineteen members, among them being Mr. W. R. Herring and Mr. F. W. Goodenough. Mr. Leon Gaster is the Hon. Secretary and Mr. J. S. Dow the Secretary. Up to the time of the meeting, 164 members had been enrolled. In the list appears the names of the gentlemen already mentioned, as well as those of Mr. Alfred Colson, Mr. R. A. Dibdin, Mr. N. H. Humphrys, Dr. R. Lessing, Mr. W. Okey (Commercial Gas Company), M. Sainte Claire Deville, Professor H. Strache, Mr. W. W. Topley and Mr. W. H. Topley (Croydon Gas Company), and Mr. L. Trewby (North Middlesex Gas Company).

REPORT OF THE COUNCIL.

When Mr. Leon Gaster rose to read the report of the Council, there was an excellent attendance; the privilege of listening to an address from the eloquent and learned President no doubt being the chief magnetic cause. The report dealt with the aims and objects of the Society—above all others being the provision of an impartial platform for the consideration of illumination questions. There is reference to the international character of the organization, which, it is explained, has been made a feature with the view of securing as wide an outlook as possible on matters of illumination. It is hoped that the existing representation may be made even more complete as the value of the movement comes to be more and more generally appreciated. On the subject of the provision of an impartial platform, it is observed:

Among those interested in the formation of the Society, it has been recognized that, owing to the absence of such a platform, there has been a tendency for misleading or one-sided statements to be circulated, and there are many questions which are allowed to remain in a vague state and on which authoritative information is badly needed. It is therefore desirable to provide a common meeting ground, not only for engineers connected with different systems of lighting, but also for members of the medical, architectural, and other interested professions. Through the free exchange of views thus brought about, it is hoped that not only will those connected at present with some particular aspect of illumination learn from one another, but that eventually a certain number of experts fully qualified to take a wide and impartial view of the whole problem will be evolved. The ideal expert of this kind has been called the illuminating engineer; and there are doubtless many matters of public importance, such as street lighting and the illumination of schools, hospitals, libraries, museums, and other important public buildings in which his services would be invaluable. But for the present the career of the Society will be largely one of mutual education and the spreading of knowledge among the general public.

The ground to be covered by papers is naturally extremely wide; and there are many points of common interest to those connected with all illuminants. The nature of the papers delivered at the past three Conventions of the Illuminating Engineering Society in the United States, and the amicable and stimulating discussions to which they gave rise, suffice to show that there is plenty of matter which can be discussed for the common benefit. But, at the same time, the Illuminating Engineering Society, having expressly framed its constitution with a view to impartiality, can justly claim to be in a position to deal with problems in which the spheres of influence of the different illuminants are concerned in a manner in which no other society can do. Under these conditions the claims put forward by representatives of one or other illuminant will be examined impartially, and the possibility of misunderstandings or one-sided discussions reduced to a minimum.

In reality, the ground which it is desirable to cover in a session is almost too wide to be treated in the course of the meetings available. It is hoped, however, that the Society will be able to cover additional ground in the future by organizing courses of lectures to deal with elementary matters, or with detailed questions which appeal to experts of a certain class, but are not such as would be suitable for prolonged discussion at a general meeting. In the future the Society also hopes to be instrumental in organizing Congresses for the discussion of points of special consequence, and exhibitions of the most recent developments in lighting and photometrical and measuring apparatus.

In addition, it is hoped eventually to be in a position to accumulate information, and to deal with technical points by means of committees of specialists. In such cases, it is suggested, the international connection of the Society will be specially valuable, as it will enable the Society to be in touch with experts in all parts of the world, and, if necessary, to organize series of researches in different countries on a common and predetermined course of action. It is also anticipated that the international connection of the Society will enable it to be specially instrumental in dealing with points of international importance, such as questions connected with units, nomenclature, standardized conditions of testing, &c. At present it is recognized that, owing to the difference in the conditions under which researches in various countries are carried out, often the results obtained are not inter-comparable.

PROFESSOR THOMPSON'S ADDRESS—NEEDS OF ILLUMINATION.

We can do no more than run lightly over the Inaugural Address of the President, as a copy of it was not available—its prior publication *in extenso*, we suppose, being reserved for the official organ of the Society, of which organ Mr. Gaster is Editor. In the prelude of his deliverance, the President remarked that in these days when so many Associations exist for the diffusion of knowledge and looking after the interests of industries and art, the foundation of any new society would be a questionable expediency if it could not justify its claim to existence. To justify its claim, the founders must be prepared to show there has arisen some new industry, science, or art, or that there has arisen some real need which the existing societies fail to meet. Those who have founded this Society have no hesitation whatever in assigning justification for its existence on both the grounds named. The Society has been founded for bringing together all interested in the problems (practical and theoretical) of the art of directing and adapting light—that prime necessity of civilized as well as uncivilized existence—for the use and convenience of man. To utilize light properly, without either waste or excess, is an art or business concerned with many things other than mere production. Few members of the community are producers of light; and those who produce light have many diverse and rival processes. Between the producer and the user, there stand a considerable number of persons who are concerned with the immediate questions of distribution and utilization—men for whom no professional name has hitherto existed. They have had no organization as a body to bring them together, and to consolidate their experiences, views, and opinions. The term "illuminating engineer" is entirely a proper one. To advance the subject of illuminating engineering, to investigate throughout their length and breadth the facts within this domain, and to diffuse knowedge with respect to them, are among the Society's objects. The ascertained facts in this domain are few—all too few. Their significance is immense; their economic and social value is great; but, alas! the ignorance respecting them is as general as colossal. The subject is new—practically and essentially so, though for a hundred years there has been in use systematic distribution of the means of artificial illumination. Before 1800, however, there were no means of systematic illumination. Only in the larger cities and towns had there been any organized attempt to light streets by rows of oil-lamps. In 1819, the Commons refused to light the House by gas. In truth, there has not been much more than half-a-century of real development of organized illumination. All the newest things, both in gas and electric lighting, are affairs of only a year or two. Many people realize the immense stride made by the introduction of the mantle for incandescent gas lighting; fewer people realize the significance of the corresponding step forward which has begun by the metallic filament electric glow lamp. We are on both sides, and on every hand, only at the beginning of the art of illumination.

There has been another, and a very different, development going on—the growth of that branch of optics which deals with the measurement of luminous values. Photometry has been growing into an exact science by the exploration of its laws, and by the improvement of the means of light measurement. The President traced the progress of photometry from 1760. It was in the early eighties that there came photometers for the measurement of the illumination of surfaces. The field of activity is wide enough here. We deal in it with illumination rather than lights—illumination by day as well as by night. We have to reduce the present chaos to an exact science. We have to secure some common means for the measurement of illumination, and the establishment of reasonable rules as to the amount of illumination that is required in different cases. Foremost, in the objects of the Society, stands the question of the units of measurement and the instruments to be used. We have to get international agreement as to the unit of light, and what shall be taken as the requirement for the illumination of a surface. "One candle" is no longer to be a vague thing, dependent upon the humidity of the atmosphere, and liable to change of temperature. The new definition agreed upon professionally is an ideal unit, in terms of which one can describe the several standards that are in use. We shall have henceforth an international candle equal to the *bougie decimale* accepted in France, and related to the Hefner in Germany in relation of 10 to 9. Existing standards will not be interfered with. We may still have our Harcourt 10-candle pentane, or Fleming's 10-candle lamp, or the German Hefner, or the French 10-candle Carcel. It is the unit for which we seek international agreement—the ideal candle.

We have still to find agreement in the standard of illumination. In England, we have grown accustomed to deal with illumination in terms of the candle-foot—meaning the intensity of illumination on a surface situated at a distance of 1 foot from a light of 1 candle. On the Continent, others have attempted to get us to adopt the term "lux." Adopting the candle-foot, some competent authorities say that, for the purpose of reading, an illumination is required not less than 1 candle-foot; some other authorities say 1½ candle-foot. [The President prefers in using a term of the kind to keep to the singular.] The facts appear to be that reading is impossible with illumination so small as $\frac{1}{10}$ candle-foot; reading is fatiguing at $\frac{1}{2}$ candle-foot. It is, however, comfortable with 1½ or 2, 3, or 4 candle-foot. If it exceeds 8 candle-foot, the glare is too great. The necessity of the degree of illumination depends upon a number of factors, size of type, or nature of work, and something also depends upon the sight of the eye. Very seldom does one find in any ordinary room an artificial illumination exceeding 3 candle-foot. By day, on a writing-table placed near a north window, or, in fact, near any window receiving direct illumination, there will be from 3 to 4 candle-foot. What is the meaning of the term "well lit" as applied to any factory, workshop, or school room? "Well lit" was at one time vague; now we have exact terms for expressing it. For a writing-table one must have at least 1½ candle-foot. In school-rooms where, on the desks, the illumination is less than 1 candle-foot, it is suspect. This comes from being in a position to apply numerical terms to illumination by the aid of scientifically devised apparatus. The naked eye is notoriously a bad judge. The powers of its discrimination are very limited. The eye can equate; but it cannot appraise.

It is convenient here to mention that there are three distinct things a photometer may be employed to measure. First, the intrinsic brightness or the effulgence of a source of light, the amount of which is expressed by saying it has a power equal to so many candles. Secondly, photometry is wanted for illumination at the surface, to be expressed in terms of candle-foot, candle-metre, or lux. Illumination is independent of the nature or colour of the substance on which the illumination falls; just as rain is on ground. We need photometers to measure not how much light looks on a surface, but how much light falls upon it. Thirdly, photometry is wanted to measure the luminosity or the specific brightness of a surface. The amount of light given off from an illuminated surface, per square inch, varies enormously. It will depend upon the quantity of light thrown by the source, and upon the surface itself. The photometry of the specific brightness of an illuminated surface has been very little studied. It is, however, of great importance; and we ought to be able to give accurate figures. We should be able to say just how much a certain wall paper or a certain coloured paint will throw back the light that it receives. The President referred to the various illumination photometers—the Preece-Trotter, Edgcumbe, Haydn-Harrison, and others, and to his own work.

Referring further to the openings there are for useful activity by the Society, the President suggests the appointment of Technical Committees, charged with the duty of preparing reports on different branches of the subject of illumination, the collection of scattered information, scientific research, &c. The specific brightness of surfaces, refraction, and reflection are subjects of vital interest to illuminating engineers, and are awaiting inquiry. Physiological problems also demand investigation. How the unshaded arc lamp cuts the eye by the very concentrated action of its rays, and how great can be the specific illumination of a surface without the eye enduring irritation, are also queries of importance. There is much work at hand. There are even more important questions before us—more important in the sense of their relation to the body politic and to the public welfare. With a standard of illumination, and simple portable photometers with which to measure the illumination, there can be no excuse for ignorance in respect of the lighting of any place. School-houses are the most important of all places. The bad results which come from the imperfect illumination of schools are greatly to be deplored, because they imperil the eyesight of the nation. The light a desk receives should not be less than 1 candle-foot. The fact that we can measure the illumination, and need no longer guess what it is, should be made widely known. Surely all these things can be reduced to scientific terms. Progressive myopy is the result of bad lighting. We have to stop that by having places well lighted, with the walls and the ceilings properly surfaced. What is the use of covering walls and ceilings with that which will not reflect light? Shade itself may also be a right thing in a room. A desk well lighted, with shade in other parts of the room, is liked by the President; the latter being very restful for the eyes. Glare and its avoidance in illumination is to be the first subject to be taken in the business of the session. The Home Office, the President says, ought also to thoroughly look into this subject of illumination, and place the illumination of factories and workshops on a proper scientific basis. At present, all they ordain is that such a building must be "adequately lighted." There are various views as to what constitutes adequate illumination; and the employer should be given proper regulations, and made to give proper illumination. In Holland, an adequate lighting standard for ordinary factories is prescribed at from 10 to 15 candle-metres. Divide the 15 by 11 and one gets rather more than 1 candle-foot as the amount of prescribed illumination. Another thing the Society can do is to assist architects and surveyors to do their work. The President criticized the architects' inaction in regard to illumination, and stated a case where an architect had not prepared any specification as to the lighting of a building, or even stated where the lighting was to be, but left the whole thing to the builder. Architects and builders, however, are not to be blamed, because there has been nothing definite hitherto to guide them. Mr. Voysey, the Electrical Engineer for the Corporation of the City of London, had scientifically gone into the question of street lighting, and had stated how much light is required on the surface of the street. Henceforth lamps must not be placed in any haphazard fashion; but the lighting contractor must be told what is to be done. A Committee of the Society might, the President thinks, be appointed to draw up specifications for different classes of lighting.

The President sees a great work in front of the Society. There is a definite mission before it; and no other Society is doing the same kind of work. Therefore the Society may claim to be one

of public utility. The President has somewhat larger ambitions. He hopes as the years go by, and the Society gains in power and experience, and the public recognize the value of the work done by it, that it will blossom out into an Institution of Illuminating Engineers. To gather and spread information and knowledge, to create public interest, and to wake up public bodies to the fact that these matters are of economic and social importance constitute a useful work. The work of the Society is the diffusion of light.

Sir BOVERTON REDWOOD, in moving a vote of thanks to Professor Thompson, remarked that it was very true, in regard to illumination, that we are not able to employ effectively that which we have. Neither is regard paid to the risks that the lavish employment of illumination may entail. There is a craze for more light, just as there is a craze for more speed. But it is necessary that there should be some controlling influence, unless harm is to result; for with all the changes in light, the eye remains unchanged. Therefore one of the most important functions of the Society will be to see that measures are adopted to minimize, as far as possible, the effects of brilliant illumination on the optic apparatus. He was glad to hear that the subject of glare was to receive the early attention of members. Having expressed his appreciation of the valuable work Mr. Gaster is doing, he said that those who know Professor Silvanus Thompson were satisfied that no better choice could have been made for the first President of the Society.

Mr. A. P. TROTTER seconded the motion; and support was given by Dr. J. S. HALDANE (one of the Metropolitan Gas Referees), Mr. W. M. MORDEY, and others. Dr. Haldane is of opinion that the Society will become more and more interesting to his brother physiologists, and that they will soon be found making useful contributions to its proceedings.

STANDARD UNITS OF ILLUMINATION AND CONVERSION FACTORS.

NEARLY two years ago, Dr. B. Monasch, when dealing with the incongruities of international photometrical nomenclature, furnished a table of factors, by means of which illumination data of one country could be converted into those of another. The factors then given were based upon the standard units of light and their relative values as communicated officially to the Zurich Commission of 1907. Herr Monasch pointed out clearly the confusion which was likely to, and actually did, arise from the employment of varying light units and their illumination derivatives. He suggested that on the determination of an international unit of light intensity, the Photometrical Commission should insist upon its use by the various countries. It was added that while different nationalities might be at liberty to employ their own units of length and candle power in measurements and calculations, the results obtained should be converted into values expressed in terms of the international unit by multiplying by a suitable factor. It was to this end presumably that Dr. Monasch then furnished a certainly serviceable table of factors.

Since that time, an international candle unit has been virtually agreed upon by at least three countries; and the Bureau of Standards at Washington are now expressing their results in the unit thus accepted. To bring his factors into line with the new ratios of the international candle, Dr. Monasch has just published the following table in our contemporary the "Illuminating Engineer." The table is, of course, based upon the ratio of one pentane candle being equal severally to one American candle, one bougie décimale, and 0·90 Hefner candle.

Results expressed in	Factor for Conversion into Desired Unit.				
	(1) Hefner Metre (German "Lux.")	(2) Hefner Foot.	(3) International Candle Foot.	(4) Intern. Candle Metre. Bougie. "Lux."	(5) Carcel Metre.
1.—Hefner metre (German "lux")	1	0·0929	0·0837	0·9009	0·093
2.—Hefner-foot	10·76	1	0·9009	9·71	1·001
3.—Intern. candle-foot	11·95	1·11	1	10·76	1·034
4.—Intern. candle-metre, bougie metre, "lux"	1·11	0·103	0·0929	1	0·104
5.—Carcel-metre	10·75	0·9936	0·966	9·61	1

The death occurred last Wednesday, in his 74th year, of Alderman Alfred Evans, one of the oldest members of the Manchester Corporation. He entered the City Council in 1876 as representative of the Medlock Ward, and eleven years later was made an alderman. His chief work on the Council was in connection with the Gas Committee. His business as a plumber made his selection for the position of Chairman of the Street Mains and Lighting Sub-Committee appropriate. He was of a retiring nature, and was rarely heard in Council debate; but he did valuable work.

HUMPHREY'S INTERNAL-COMBUSTION PUMP

And Other Applications of a New Principle.

NEVER on any occasion have we seen the lecture theatre of the Institution of Mechanical Engineers so crowded as last Friday evening, when Mr. HERBERT A. HUMPHREY came forward to explain the new principles on which he has constructed the ingenious internal-combustion pump, which was described and illustrated in the "JOURNAL" for Oct. 26 (p. 254). The PRESIDENT (Mr. J. A. F. Aspinall) was in the chair.

On Mr. Humphrey being called upon to read his paper, he was received with enthusiastic cheering. The paper was an extensive one; and we are unable to do more than give the following extracts from it. Some excellent elucidating cartoons were exhibited in the hall, together with models illustrating the valve gear of one of the pumps and the ignition arrangement. These the author explained without reference to the paper.

Pumps play such an important part in every branch of engineering, that no apology is needed in bringing before the notice of the Institution a construction of pump based upon entirely new principles. Every engineer is familiar with pumps driven mechanically or by steam, and recently there has been considerable development of pumps driven by gas-engines. The South Staffordshire Mines Drainage Commissioners, for instance, have replaced steam-engines by gas-engines in five of their pumping-stations, with very beneficial results; the change having led to considerable economy of working. Compound condensing direct-driven steam-pumps of modern construction and large size are among the most economical of all steam-using plants; and, under favourable conditions, they will give a pump-horse-power-hour for an expenditure of 18 lbs. of steam. The author's aim has been to produce a pump of the greatest simplicity and strength of construction, in which the explosive force is exerted directly upon the water, and in which no rotating fly-wheel, solid piston, connecting-rod, crank, bearings, or glands of any sort are required; and, as the results of his experiments, several very successful types of pumps have been invented and set to work on a sufficiently large scale to demonstrate their utility and economy.

The idea of exploding a combustible mixture of gas and air to produce pressure on the surface of water, with the object of raising that water, is, of course, not new; and attempts to put the idea into practice date back to 1868. The efforts have all been directed too much along the lines of ordinary pumps, in so far that the water lifted has always been forced past a non-return valve; and the operation of such a valve with the explosive force behind it has been inevitably disastrous. In the type of pump invented by the author, there is a full-bore passage from the combustion chamber to the final outlet; also some of the water pumped to a high level by the energy of the explosion is allowed to return again to compress a fresh combustible charge. When sudden changes of velocity occur in masses of a heavy and incompressible liquid, like water, great difficulty is found in controlling the movement of the liquid. All such difficulties are removed in the author's pump by allowing the movements of liquid to control the pump, and by causing the mass of liquid moved to be sufficiently large, so that the velocities are never excessive. The mass of water forms a pendulum which springs between the high and the low level, and, by its movement alone, serves to draw in fresh water, exhaust the burnt products, draw in a fresh combustible charge, and compress the charge previous to ignition. With the movements of the liquid quite unrestrained by any of the usual mechanical appliances, the result is a pump which works with freedom from shock and noise, and requires very few working parts.

The researches and experimental work, which have occupied three years, constitute an attack upon the gas-pump, gas-turbine, and gas-engine problems, and these three have been so closely associated in the author's mind that it is almost impossible to treat the gas-pump as a thing apart. It seems natural and proper, therefore, to first of all present the general scientific aspect of the problem.

Every text-book which deals with the theory of the gas-engine contrasts the theoretically perfect indicator diagram with diagrams obtained in actual practice. There is no gas-engine on the market working on a cycle which permits expansion of the ignited gases to be carried beyond the original suction volume. As a consequence, when a gas-engine is working at full load, the exhaust gases are rejected at a high temperature and at a pressure of two to three atmospheres. The energy that is wasted is a considerable percentage of the total energy converted into work; and we must put this waste down as an inherent defect in all existing types of gas-engines. The requirements for a perfect cycle are as follows: (1) The suction stroke taking in the combustible mixture. (2) The compression stroke, the length of which is dependent upon the compression pressure desired. (3) The working or expansion stroke, which should be much longer than the suction stroke, in order to fully utilize the work of the expanding gases. (4) The exhaust stroke, which is another long stroke, comparable with the working or expansion stroke, but the exact length of which depends upon the clearance space. All four strokes should be of unequal length; and a perfect gas-engine should be capable of meeting these conditions.

Let us now for one moment consider the actual construction of

the gas-engine as it exists to-day. We find a solid piston with its water-cooling arrangements, its piston-rings, its piston-rod and somewhat expensive type of gland packing, and the usual connecting-rod, cross-head and guides, and then the crank-shaft and fly-wheel with the massive bearings, lubricating devices, and strong framework. If we take the Otto engine as the simplest type of engine, and which often dispenses with the piston-rod, we yet have the two-to-one gearing with the side-shaft carrying the cams to operate the necessary levers and valves. How much of all this is really necessary? In answering this question, a list of the actual essentials which a gas-engine must possess may be made out as follows: A working cylinder, an inlet-valve for the combustible mixture, an exhaust-valve for the burnt products, a fly-wheel, and an ignition device.

Obviously, the numerous things which belong to a gas-engine outside of these essentials would readily be dispensed with if it were possible to do without them; and we should then arrive at a gas-engine in which the energy was delivered direct to the fly-wheel without any intermediate gearing. To retain this degree of simplicity, the fly-wheel would also have to fulfil the functions of a piston which draws in a fresh combustible charge and compresses it in the cylinder. If we imagine everything discarded which first principles do not demand as necessary, our ideal engine will have the following properties and parts: (1) It must be capable of giving four unequal strokes. (2) It must utilize the whole possible range of expansion down to atmospheric pressure. (3) The energy must be delivered direct to the fly-wheel without any intermediate parts. (4) There must be internal cooling arrangements, so that the cylinders may be made of any size within the limits of structural possibility. (5) There must be an ignition device, but, as there is no two-to-one shaft to operate it, it must be entirely automatic, and depend only upon the compression pressure having reached a maximum. (6) Difficulties connected with contraction and expansion must be eliminated.

Having evolved our conditions for an ideal engine from first principles only, the question is: How far can a practical machine be made to meet these conditions? So far as a prime mover on these lines is concerned, the author believes that a practical solution can be found; but the following considerations tempt him to depart from a direct solution. Granted that water is needed for internal cooling, then surely it is better to use a water-piston. If this piston is made heavy enough, it may well serve as a fly-wheel; but it will be a reciprocating instead of a rotary fly-wheel. Here, then, the temptation to extreme simplicity comes in. Let us for the moment abandon the idea of a prime mover with a rotating shaft, and allow our water fly-wheel to so reciprocate that at each working stroke it leaves a quantity of water at a higher level or pressure. This only requires the fitting of a single water-valve; but our final apparatus becomes a pump instead of an engine, and our gas power appears as water power.

The arguments and conclusions having been stated, we are in a position to proceed with a description of the apparatus employed by the author in carrying out the principles involved. The simplest form consists essentially of a combustion chamber, fitted with an inlet-valve for the combustible mixture, and an exhaust-valve for the burnt products. A pipe connects the bottom of the combustion chamber to a low-level and a high-level tank, and between this pipe and the former there is a water-valve. The inlet-valve is normally kept shut by means of a spring; but the exhaust-valve has no spring to hold it up, and falls by its own weight when a pawl is removed from under a collar fastened on the exhaust-valve stem. This pawl is operated from the water-valve in a simple manner, so that when the water-valve opens it releases the exhaust-valve. Supposing all the valves are shut and a compressed combustible charge exists in the top of the combustion-chamber, the rest of the chamber and the pipe are full of water. Explosion occurs at a sparking plug, and the increase of pressure drives the water downwards in the chamber, and forces the column of water contained in the pipe to move towards the high-level tank, so that a quantity of water is discharged into it. From the moment when ignition occurs to the time when expansion reaches a pressure equivalent to the static head of the water in the high-level tank, the excess pressure in the combustion chamber has been increasing the velocity of flow towards the high-level tank, so that at the end of this period the column of water has considerable velocity. The kinetic energy thus acquired causes the water to continue to flow in the same direction, until the pressure on the under side of the water-valve is less than that above it, and the difference of pressure causes this valve to open. This occurs when the products of combustion have expanded to about atmospheric pressure. The opening of the water-valve releases the exhaust-valve, and now water from the low-level tank flows past the water-valve partly to follow the column of water still moving towards the high-level tank and partly to flow into the combustion chamber to expel some of the exhaust gases. There is, of course, a tendency for the water to rise in the chamber to the same level as the water in the low-level tank; but usually a little before this level is quite reached the kinetic energy of the moving column has been expended in forcing more water into the high-level tank, and the column has therefore come to rest.

At this point of the cycle the spring on the water-valve quietly closes this valve, and is assisted by the water now trying to flow back from the high-level tank to the chamber. It cannot flow back far, because there is already a considerable quantity of water in the chamber; and as the column rises farther, it reaches the exhaust-valve, and, striking against it, shuts it by impact. The exhaust-valve is immediately locked shut, by the pawl engaging under the collar of the valve-stem; and now that there is no longer any outlet for the small quantity of burnt products which remain, they are imprisoned in the top of the chamber, and suffer compression as the water continues to rise, until the energy thus stored in the compressed elastic cushion is equivalent to the energy given out by the falling water. Thus the elastic cushion serves to bring the column of water again to rest; and as the compression pressure considerably exceeds the static head of the water column, a reverse flow is set up while this cushion expands again. If there were no friction losses, the water column would be forced back by the cushion to the same point as that from which it started—viz., to a level in the combustion chamber a little below the level of the water in the low-level tank—but it actually does not move quite so far. However, when the water passes the level of the exhaust-valve, the elastic cushion is again at atmospheric pressure, and the further descent of the water in the combustion chamber tends to create a vacuum. But the inlet-valve is only held shut by a light spring, and can therefore readily open to admit a fresh combustible charge during the rest of the descent, and until the water column is once again at rest. The state of affairs now reached is, of course, still unstable, because of the unbalance pressure due to the head in the high-level tank; and this head produces a second return of the column, so that water ascends in the combustion chamber, and compresses the fresh combustible charge. The explosion of the charge by means of the ignition-plug now starts a fresh cycle. The whole operation is so simple that when an actual apparatus on these lines was first tried it ran steadily at the very first attempt.

Height of Lift.—The quantity of water delivered considerably exceeds what might be described as the stroke of the pump or the change in volume of the gases from the time they are ignited until they expand to atmosphere. This is due to the water entrained from the low-level tank to follow the moving column of liquid going to the high-level tank. Consequently, if an indicator diagram could be obtained, and the mean pressure of the stroke calculated, such pressure must be in excess of the equivalent pressure due to the head against which the water is raised. The burnt gases always expand down to atmosphere; therefore their mean pressure is less than that obtained in an Otto cycle gas-engine, since the stroke is so much greater. As a result, the head against which the water is lifted is limited to some 35 to 40 feet in most cases. This limitation is, however, entirely overcome by one of several arrangements which enable water to be raised to practically any pressure required.

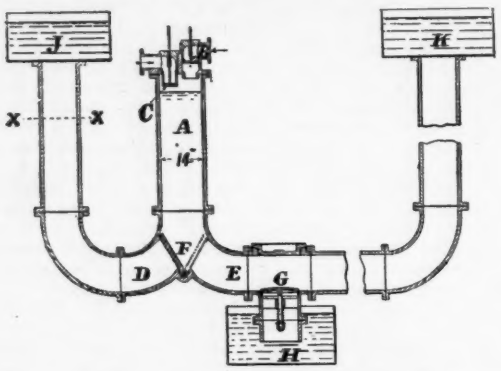
Length of Pipe.—The length of pipe between the combustion chamber and the high-level tank must be sufficient to contain such a mass of water that its kinetic energy at the maximum velocity shall ensure the burnt gases being expanded to atmosphere. This is the limiting condition; but the pump will work with any greater mass of water. If we fix, as an example, 10 or 12 feet per second as the maximum velocity, then the smallest quantity of reciprocating water can be calculated for a given set of conditions. Theoretically, a comparatively short pipe of large diameter is better than a long pipe of smaller diameter; for not only can larger quantities of water be pumped without exceeding the maximum velocity of flow, but the time of a cycle is less with the short pipe.

Supply-Tank.—Since the volume of combustible mixture drawn into the combustion chamber is partly dependent upon the level of water in the supply-tank, any alteration in this level affects the working of the pump, and affords one simple method of regulating the amount of energy developed at each cycle. Thus, by raising the level of the water, smaller charges are drawn in; and, conversely, by lowering the level, larger charges result.

Compression Pressure.—The fact that the column of liquid which returns to compress the fresh combustible charge in the pump attains velocity in so doing, and then has its kinetic energy transformed into pressure energy, is most useful; for it enables compression pressures to be used greatly exceeding the static pressures due to the head of water which causes the return flow. As the compression pressure is raised, the average pressure throughout the stroke is also raised, which means that the pump can deliver water against a greater head. But the greater head causes a greater compression pressure; and hence the pump is largely self-regulating. Thus, if called upon to pump against a greater head, the compression pressure automatically rises, and brings about conditions favourable for the increased work.

Starting, Stopping, and Controlling.—In first starting the pump, all that is necessary is to allow a charge of compressed air to flow into the combustion chamber, and so depress the water-level a little below the usual charge volume. If the exhaust-valve is now forcibly opened, the water will rise in the chamber, close the exhaust-valve, and give the cushion and charging strokes. The charge drawn in is then fired, and the pump starts working. If the pump is at work and it is desired to stop, it is only necessary to switch-off the current which operates the sparking coil. The pump then stops with a charge of unexploded mixture in it, and can at any time be started again by merely switching-on the current. Such simple and instantaneous means of starting and stopping enable the pump to be controlled from a distance. It can be operated from a switchboard at any convenient place. The general methods of controlling a gas-engine are applicable to the pump. The author has invented an ignition apparatus in which ignition is determined by the compression pressure reaching the maximum incidental to each particular charge.

Two-Cycle Pumps.—The pump so far described is what may be called a four-cycle pump, because there are two outward and two inward movements of the column of liquid in each complete cycle. It would clearly be advantageous to suppress the cushion stroke and the suction stroke, and so produce a two-cycle pump. We are familiar with two-cycle gas-engines in which outside pumps are used to draw in the gas and air and to force them into the working cylinder; but the production of a two-cycle pump is arrived at without any such complication. Up to the present, four types of two-cycle pumps have been constructed, and of these the simplest to explain is that shown in the diagram. A is the combustion chamber, fitted at the top with an inlet-valve B for the combustible mixture and an exhaust-valve C for the burnt



products. The bottom of the chamber is attached to a pipe having two branches D and E, and a single valve F which can close communication with either of the branches. One branch leads to a supply-tank J containing water at the level shown, the other leads to the delivery-pipe and the high-level tank K, and is fitted with a water-valve G, which in this case is shown as closing a suction-pipe dipping into a low-level tank H. When the valve F is in the position shown by full lines and the compressed combustible charge exists in the top of the chamber A, explosion takes place, and water is driven along the delivery-pipe towards the high-level tank; the gases meanwhile expanding and imparting velocity to the column of water. When expansion has been carried to atmospheric pressure, the exhaust-valve opens; and by this time the pressure on the left-hand side of the valve F will exceed the pressure on the right-hand side, and the valve swings across so as to open communication between the combustion chamber and the tank J and to close communication with the delivery-pipe. The moving column of water now has to entrain more water by sucking it up from the tank H past the valve G to follow the moving column. In the meantime, the water-level in the combustion chamber being considerably below that in the tank J, water will rise up in the combustion chamber, close the exhaust-valve by impact, and cushion the burnt products imprisoned in the top of the chamber above this valve, until their pressure exceeds that due to the static head of the liquid in the tank. A reverse flow now occurs as the compressed cushion expands again, and a charge of combustible mixture is drawn into the combustion chamber. If there is still time for the action to take place, there will be a slight compression of the fresh charge by water again flowing from the tank J into the chamber; but the main compression of the charge occurs when the column of water in the delivery-pipe, having come to rest, returns, again closing the valve G, and forcing the valve F from its dotted position back to the full-line position—thus giving free communication between the delivery-pipe and the combustion chamber, and closing communication with the tank J. When the water column has been brought to rest by expending its energy in compressing the charge, a spark at the ignition-plug ignites the charge, and a fresh cycle is started. It is not necessary that the level of the water in the tank J should be above the exhaust-valve, because if it is at a level XX the oscillation which takes place from the tank to the chamber may still carry it far enough up the combustion chamber to close the exhaust-valve. The return flow, which draws in the new charge, will then be due to gravity, as the liquid in the chamber tends to regain the level of the water in the tank J.

Passing over a large number of modifications of the types of pumps so far dealt with, the author came to a pump having two chambers, in which the explosions take place alternately. A diagram of this arrangement was shown; one of its chief differences from the other pumps being found in the fact that the introduction of the combustible charge does not depend either on cushioning or on an oscillation of the kind described.

Pumps for High Lift.—When it is desired to lift water to a height exceeding the head equivalent to the mean pressure of the indicator diagram, an attachment is added at the end of the discharge-pipe. This addition may consist of a small air-vessel, placed at the end of the discharge-pipe close to the large air-vessel into which the high-pressure water is to be delivered. The inlet into the large air-vessel is fitted with a non-return valve, and the action, when working in conjunction with a two-cycle pump, is as follows: When the explosion occurs in the pump-chamber, the water is forced along the discharge-pipe and rises in the small air-vessel, gaining velocity and compressing the air therein until the rise in pressure is sufficient to open the valve. The energy of the water column is then spent in delivering water into the larger vessel, and any backflow from it is prevented by the valve closing. There is now sufficient energy stored in the compressed air in the small chamber to produce the return flow of the column towards the pump required to compress the next combustible charge; and then the whole operation is repeated.

Pumps as Air-Compressors.—The great flexibility of the author's system is shown by the readiness with which it can be adapted to the case of compressing air. The column of liquid which reciprocates backwards and forwards from and to the pump can be made to enter an air-compressor chamber fitted with suitable valves attached to the end of what has so far been called the discharge-pipe. The energy of the moving column of water is utilized to compress air, and also to store sufficient energy in an elastic cushion to produce a return flow towards the pump so as to give the compression stroke. This movement of the column also serves to draw a fresh quantity of air into the compressor.

Efficiency Tests.—The first experiments were carried out at Brimsdown; but in the early part of 1908 a testing-station, specially designed to facilitate the testing of the pumps, was erected on ground belonging to the South Staffordshire Mond Gas Company at Dudley Port. Many tests of efficiency have been made with the plant described; and an official test of a four-cycle Humphrey pump was carried out by Dr. W. Cawthorne Unwin, F.R.S., and his assistant at Dudley Port on the 21st and 22nd of September this year (see *ante*, p. 254). As to thermal efficiency, it has already been mentioned that theoretically the pump cycle is superior to that of the Otto gas-engine or of any other gas-engine in which the volume of the expanded products is the same as the original charge volume. Although the pump-cycle curve is always above the Otto-cycle curve, the efficiencies of the pump are greatly in excess of those of the Otto engine at low compression pressures. This is much to the advantage of the pump, because it enables a good commercial efficiency to be obtained with relatively low working pressures.

Application of the System for Power Purposes.—The curves just mentioned are specially interesting, because they lead one to recognize the possibility that, as the author's system comes to be developed in the future, internal-combustion pumps may be substituted for gas-engines in central electric power stations. If the water pumped is passed through an ordinary water-turbine driving an electric generator, and the water is then returned to the pump to be used over and over again, we arrive at a gas-power electric system with the water forming a hydraulic coupling. Even now the combination of the author's pumps with water-turbines gives far greater economy than that reached by any internal-combustion turbine so far constructed. It is, of course, dangerous to prophesy, but there is no harm in looking so far ahead into future possibilities in order to see what a central station on the new lines might be like. The advantages of an arrangement suitable for this purpose are fairly obvious, and arise chiefly from the simplicity of the working parts, the absence of noise and shock, and the exceedingly low cost of upkeep. In gas-engine stations using cheap producer-gas or blast-furnace gas, the cost of lubricants and stores frequently exceeds that of fuel; but in the present instance there is practically no lubrication required, and the author has worked one of his pumps for a week at a time with absolutely no lubrication whatever. Based on the efficiencies so far obtained, a Board of Trade unit can be generated for 2 lbs. of anthracite coal; and with the large units of plant required in central stations, this figure should be much reduced. If the internal-combustion pump proves in the future to be a successful competitor of the gas-engine for power purposes, it is probable that one of the most useful fields for its employment will be found in the propulsion of ships.

[In an appendix to his paper, the author gave a summary of Dr. Unwin's report to which he had referred.]

Discussion.

The PRESIDENT, in opening the discussion, said the members had been shown that once again some of the functions of the steam-engine were going to be absorbed by the gas plant; and if, as they hoped, the author's prophecy came true, it looked as if, while they had been accustomed to get a silent drive by means of the excellent workmanship (he would say) of the Renold chain, the author was going to give them a fluid drive which would enable them to pass on the liquid chain in a ceaseless flow, and in this way give a perfect mechanical drive.

Mr. HENRY DAVEY (London) said the author commenced his paper by endeavouring to establish a comparison between the economy of steam-worked pumps and gas-worked pumps as they exist. Mr. Humphrey stated that the South Staffordshire Mines Drainage Commissioners had replaced steam-engines by gas-engines in five pumping-stations, with beneficial results. This was scarcely correct. The facts were the Commissioners had recently erected three new pumping-stations provided with steam plant; and they had also erected five gas-engine plants for temporary purposes, where it was not desirable to put up permanent plants. He had last year's report of the Commissioners, in which it gave in detail the cost of working all the plants—steam and gas, both new and old; the net result being that the average annual cost of raising a given quantity of water a given height was twice as much with gas plants as it was with steam plants. The report also showed that one of the steam plants which had

been at work night and day for the last 25 years was twice as economical as the best gas plant. The gas plants were small as compared with the steam plants; and, as they knew, a small gas-engine was nearly as economical as a large one. The author also stated that compound condensing direct-driven steam-pumps of modern construction and large size were among the most economical of all steam-using plants; and, under favourable conditions, they would give a pump-horse-power-hour for an expenditure of about 18 lbs. of steam. As a matter of fact, such plants as these described gave a pump-horse-power-hour on an expenditure not exceeding 12 lbs. of steam; and there were recent examples much lower even than that. But taking 12 lbs. as quite common now, the 18 lbs. of steam was a disreputable example. While on this question of economy, he should like to make one or two observations on the results obtained in working Mr. Humphrey's pump. From a thermal point of view, 13,000 B.Th.U. per pump-horse-power-hour was not much better than the best results got with the best water-works engine. But they did not put B.Th.U. into their banking accounts, but bawbees. As to the money point of view, and taking Mond gas at 2d. per 1000 cubic feet (which was the price paid for working the gas-pumps already alluded to), the 0·85 cubic foot per pump-horse-power-hour taken by the author's pump would cost 0·17d. With cheap slack, which would evaporate 5 lbs. of water per pound, and not cost more than 4s. 6d. per ton, a steam-pump, using 20 lbs. of steam per pump-horse-power-hour, would cost for fuel, not 0·17d., but 0·096d. In water-works generally, coal cost 16s. per ton. To evaporate 8 lbs. of water per pound of coal, and taking 12 lbs. of steam per pump-horse-power-hour, the cost worked out at 0·13d. per pump-horse-power-hour. The result obtained by the author from the thermal efficiency point of view was a remarkable one; and it promised very much for the success of the pump. It was quite a refreshing thing to meet with an inventor who recognized the advantage of direct application, and did not waste any of his power in transformations. With regard to making use of the water-pump to secure the functions of a fly-wheel, that in itself was old; it existed in the water-ram of more than a century ago, and in many direct-acting pumping-engines. The author, however, had made quite a new departure in the application of the principle. It was difficult to see the possible extent of the application, because they had not yet the experience of pumps applied to doing actual work under ordinary conditions. At first sight, the pump appeared very bulky for its power; and one would have liked to have seen examples of pumps designed to meet the ordinary conditions of everyday work. No relative particulars were given of power, size, or cost; so that it was difficult to discuss the pump from the practical point of view. What he meant by the pump being very bulky was that the pipes must be regarded as part of it. He also commented upon the weight of metal it would be necessary to have in the pipes.

Dr. Unwin (London) thought it was rather unusual for the Institution to receive a paper dealing with engineering practice in the pumping of water which contained an absolutely novel method of dealing with the problem, carried out past its experimental stage to a point at which the pump could be applied to order for any required conditions. He had had some knowledge of what Mr. Humphrey was doing for about a couple of years past. He saw a pump exactly like the one he finally tested, but of somewhat smaller size, working a year ago perfectly satisfactorily, and of nearly the same efficiency as the pump he had tested. So far as his experience went, he could speak only of this particular form of pump. Mr. Humphrey had shown an extraordinary fertility of resource in designing numerous other forms, some of which the inventor had experimented with considerably. He (Dr. Unwin) should like to say that the action of the pump, though he was a pretty old engineer, came upon him as a real surprise. Once started, it not only worked without the slightest hitch whatever, but it had a curious flexibility which enabled one to play tricks with it—for instance, to alter the lift, and to alter other conditions of working—and the pump seemed to take no notice of it at all. He (Dr. Unwin) worked through a whole series of trials throughout a whole day, with varying lifts, without the slightest alteration of anything about the pump. All they did was to put more pressure against the pump. But it worked without any hitch whatever, without missing a single ignition, or anything happening that was wrong. The results, so far as efficiency went, were, he thought, rather extraordinary. As to Mr. Davey's remark that a steam-engine requiring 18 lbs. of steam per pump-horse-power-hour was disreputable, he thought that gentleman had overlooked just one point. He (Dr. Unwin) was perfectly well aware that there were triple steam pumping-engines working with 12 lbs. of steam; but he thought it would be found that they were working on fairly high lifts. It so happened that the losses of working of a reciprocating pump were nearly the same whether the lift was great or small; and therefore the efficiency of a pump working on a low lift was very much less than one working on a high lift. He would challenge Mr. Davey to produce a pumping-engine working on a 40-feet lift, and working on much less than 18 lbs. of steam per pump-horse-power-hour. The pump he tested was working under conditions of ordinary practice; and repeated experiments led to the same results. As Mr. Humphrey had indicated, if they could do pumping as cheaply as this pump seemed able to do, it had many applications. If there was any fault at all with it, it was that it was a somewhat cumbrous pump for the amount of power developed. This would limit its use in certain cases; but there were a large number of cases where the cumbrousness of the pump was of no importance. It consisted almost entirely of pipe work; and this was cheap work. The use of the pump for compressing air seemed to him to be an important one, because it would be competing with machinery which was only of very moderate efficiency.

Mr. W. B. Bryan (Metropolitan Water Board) remarked that, looking at the invention from his point of view as a Water Engineer, it seemed to him that for low lifts, it had a magnificent field before it, though it might be a little bulky. There was one point in connection with the pump upon which he should like information. It was, Would the products of combustion of the gas cause any tarry or oily appearance on the surface of the water? This was important in his view, although for the filling of large reservoirs from a river (with a lift of, say, 20 to 30 feet), the water being subsequently filtered, perhaps a minute amount of oil or tar on the surface would not matter much. As to the efficiencies spoken of in regard to steam pumping, he could not agree with Mr. Davey that 18 lbs. of steam per pump-horse-power-hour was disreputable. Those of them who had to pump hundreds of millions of gallons of water per day, week in and week out, knew that, if they got only 18 lbs. of steam used per pump-horse-power-hour, it was not at all bad. They had engines doing on trial 12 to 13 lbs. But taking the year through, there were a great many losses, cleaning-out of boilers, &c.; and they had to take into account also that every pound of coal that went into the stoke-hole worked up against the year's financial account. He did not know just what losses there would be in Mr. Humphrey's pump in twelve months' working; but he thought it was quite a novel departure from all ordinary pumping installations. He hoped they would, in a very short time, have some trials on a large scale. Then Mr. Humphrey would be able to come before the members twelve months hence, and tell them the results that had been obtained in actual working over a long period.

Professor C. Vernon Boys (London) remarked that the paper by Mr. Humphrey had appealed to him from the scientific point of view very strongly indeed. He had been struck by the one distinguishing feature of this pump above all other pumps—that was, the getting rid of the non-return valve. The thing was so revolutionary and surprising that one could not help being struck by the fact, and admiring the result. The expansion to atmospheric pressure was scientifically of the utmost importance, and was responsible for a considerable proportion of the efficiency obtained. Perhaps, however, the most surprising part of this pump or engine, as compared with any other machine yet made was this—that, when all was cold, and all was absolutely at rest, just one touch of the "button" instantaneously started the machine, and set it going full speed. No other engine was in any respect like this. Another thing that had struck him was that the valve gear was equally applicable whether the engine was working two-cycle or four-cycle. But he was not quite certain whether it was fair to say that, because, when he read the paper, he found, on looking at it very closely, though the pump was working two-cycle the valve gear was working four-cycle; so that the valve gear did not know what the pump was doing. [Laughter.] This pump was one of those things that, if he had had the good fortune to think of it, he should have had some hesitancy in trying, because he should have had doubt that the thing would work in the beautiful way it had done. In actual work, they should look upon it as a combination of a "Pulsometer" steam-pump on the one hand and a water-ram on the other. The material that Mr. Humphrey had to deal with was a mixture of permanent gas and steam; and when they met in the hot state, the steam which was immediately adjacent to the water was no doubt at once condensed, so that the steam did not have to do the work that the pulsometer was doing. This machine, unlike many other machines, appeared to have this extraordinary merit: It had so far been made of what they might call moderate low power; and it would seem that, in going from a small machine to a big one, the difficulties, instead of being larger, would be less. If a 10 or 15 horse-power engine went as described, how much better would a 1600-horse power engine be? He could not help thinking this would be the case, because, when a machine was made large, the losses were less in proportion. There were no difficulties of conduction of heat through the walls of a cylinder, and there was no chance of the bursting of any cast-iron part, because that which contained the working mixture could be made out of boiler plates, riveted together—a kind of thing which did not burst. [Laughter.] He also asked, supposing a pump of this sort was set to work to pump water in which was mixed fine igneous sand, whether the many water inlet-valves were of such a kind as would be likely to last; and, if they were not, whether they would be easily replaced without doing much mischief? Also whether the exhaust-valve, on being smacked on the face with the dirty water, would get enough sand upon its seating to coat it, and make it leak? If this was the case, would it not be possible, on the water rising and shutting the valve by impact, for the water to act on some intermediary, so as to save the valve from direct contact with the water?

Professor Threlfall said he should like to see the pump turn out the gas-engine at once, with its heavy charges for oil and maintenance. Mr. Humphrey said he could do a kilowatt-hour upon a consumption of 2 lbs. of anthracite. Comparing this with a good gas-engine, it was an enormous consumption of fuel; but if the author was going to do away with oil and repairs, he could start "right now" and make a very successful gas-engine business. It was true the engine would be very large; but he did not think that would be of the slightest importance. The only thing was

that one liked a small engine on account of the small house. He thought there would be danger, if the gas was not purified from sulphur, of sooner or later the water becoming saturated with sulphurous acid. The thing that appealed to him, and did so very strongly, was the extraordinary simplicity of the invention.

Further discussion was adjourned.

AMERICAN APPRECIATION OF THE SLIDING-SCALE

At the recent Annual Meeting of the American Gas Institute, a paper on "The Sliding-Scale Regulation of Prices and Rates of Dividend for Gas Companies," prepared by Mr. ALFRED E. FORSTALL, of New York, was read, in the author's absence, by Mr. WALTON FORSTALL. The following are the principal portions of the paper.

The early recognition of the fact that all men, and not especially those from Missouri, have to be "shown"—that is, must learn from actual experience rather than from the example of others—is indicated by various ancient proverbs. Such a necessity seemed reasonable when only inadequate means existed of ascertaining the exact facts as to the experience of others and the results of this experience; but it seems very unreasonable whenever, as is now usually the case, it is possible to obtain complete information in regard to the history of the development of an industry in the country in which it originated, and the method of conducting it which this development has proved to be the best of those at present known. Nothing, however, shows greater inability to profit by the experience of others, and so save the disastrous results of repeating experiments which have failed, than does the development in the United States of the control of the prices charged and the rates of dividend paid by gas companies.

In spite of the facts that the business had already had in Great Britain a history covering about fifty years when it began to become of importance in America, and that the teachings of this history were recognized and proclaimed by the leaders on the technical side of the industry many years ago, the gas industry was allowed, or rather forced, to parallel the experience in Great Britain. This had shown that unlimited competition between gas companies was detrimental not only to the companies but also to the communities served by them; but nevertheless such competition was advocated and put into effect in America as if it were perfectly untried. Only after the goal of low prices for gas had been placed at a much greater distance, and rendered much more difficult of attainment, by the excess of investment necessarily involved in competition between gas companies, was the next stage reached. This stage was practically that of maximum price and maximum dividend which had already been tried in Great Britain, and largely discarded in favour of something better. Again was this experience ignored; and for the last twenty years the method of regulation followed in the United States has been, with only one important exception, that which Great Britain began to discard in 1875. Only within the last five years has any general consideration been given to the adoption in our country of the system of regulation which has been in satisfactory operation in Great Britain for upwards of thirty years.

This system is that of the sliding-scale. It consists in the determination for each company of the proper initial or standard price for gas and rate of dividend upon the stock, and the provision that for a unit reduction or increase in the price of gas the rate of dividend may be increased or shall be decreased by a definite amount. The theory is that, the initial price being such as will enable the company, under fair management, to earn and pay, and to continue to earn and pay, the initial rate of dividend, the incentive to, and the reward of, management sufficiently better than fair to make possible a reduction in the price is found in the increased rate of dividend which can then be paid if earned, while with poor management it is impossible to continue paying the initial rate of dividend by increasing the price. The community, on the other hand, since it is only entitled to the results of fair average managements, benefits by the reduction in price secured by better management, and is not made to suffer all the loss resulting from poor management. Practical working in Great Britain for thirty-four years has shown that the theory is correct, and that the sliding-scale system furnishes a real community of interest between company and consumer which is not reached in any other way. Even in the few cases where the incentive afforded by it has not proved sufficient to produce the better management, neither the community nor the company has been in any worse position than would have been occupied under any other system of regulation that has obtained in the United States. So it would seem the adoption of the system was not only advisable but imperative, if the greatest benefits derivable from the industry for consumers and companies are to be obtained.

It is essential, however, that the basic quantities of initial price, rate of dividend and amount to which this rate is to apply, and the relation between change in price and change in rate, shall be fairly determined in each individual case. In Great Britain, this determination is made by Committees in Parliament appointed each session to consider and report on the Private Bills by means of which all statutory gas and other companies are incorporated, and also obtain authority to raise such new capital as is required. [The author explained the nature of the work of the Committees.] Since no equivalent of the Private Bill Committees is found either in Congress or in the Legislature of the various States, the adoption of sliding-scale regulation in the United States would involve the selection of the body by which the basic quantities of the system are to be established for each company, or its creation in those cases where no suitable body is in existence. In States possessing Public Service Commissions, the work would properly be included among the duties of these Commissions, either by virtue of their existing powers in regard to the fixing of rates, if these are sufficiently broad, or by means of suitable amendments to the Acts authorizing them. Such amendments should contain merely the general authority; leaving the application to individual cases entirely in the hands of the Commissions. In States which do not already possess such Commissions, it would seem as if it would be necessary to create them in order to put the system into effect, since the Legislatures have neither the time nor the ability to conduct the investigations into the circumstances of each individual case that must necessarily be had before the basic quantities can be determined correctly. Legislatures already have the power to regulate rates; and what is here advocated is merely the delegation of this authority, to be exercised in accordance with general rules laid down by the Legislatures, to bodies which, if properly constituted, are more competent for the purpose than the Legislatures.

The determination of the proper initial price, the proper initial rate of dividend, and the proper amount upon which to allow the payment of this rate at the start, involves practically the same investigation of the circumstances of each case as is necessary for the fixing of the proper rate under present methods of regulation. But with these quantities properly fixed, there would be no occasion to repeat the process as must now often be done. This fact of the practical permanence of the initial price makes it essential that this price, when fixed, shall contain a margin for contingencies beyond the control of the management—such as an increase in the price of gas-making materials—and shall be such as to recognize and reward management better than the average where it exists. In British practice, the contingency element is recognized by permitting the company to earn, in addition to the amount required to pay the initial or any increased rate of dividend, extra amounts which can be set aside yearly to an insurance fund at the rate of 1 per cent. of the paid-up capital of the company, or added to the amount carried forward to the next year's accounts until this amount is equal to that required to pay the dividend for a full year at the rate corresponding to the price then charged. The amount carried forward can be used to pay dividends when these are not earned, and thus helps to take care of fluctuations in prices of materials; but the insurance fund can be used only to meet extraordinary claims and damages arising from accidents which "due prudence and management" could not have prevented, nor can it exceed a total equal to 5 per cent. of the capital of the company.

A careful following of the hearings on the Bills of gas companies, and the action of the Committees after these hearings, as reported at great length in the "JOURNAL OF GAS LIGHTING," has left the impression that there are few, if any, cases in which the initial price incorporated in the company's Act has not been higher than that at which they were selling gas at the time—thus placing the company in a position to pay a higher rate of dividend than the initial one if they could earn it at the existing price. In view of the invariable practice of complainants in rate cases to advocate the fixing of a price based upon the (from their standpoint) most favourable view of the expenses of operation for a single year, this necessity of providing for accident and contingencies and rewarding existing good management must not be lost sight of in the adoption of sliding-scale regulation.

The initial rate of dividend and the initial amount upon which this rate should be paid are to a great extent dependent upon each other; and the relation between them can be varied widely without affecting the interests of the community, provided that the product of the rate and the amount do not exceed the sum produced by a fair rate of return upon the value of the property. This fact has been recognized in Great Britain by the conversion, in the case of a number of companies, of stocks entitled to an initial dividend of 10 per cent. and an actual one of from 12 to 14 per cent. into an amount of stock entitled to an initial dividend of 4 or 5 per cent., which would yield the same total amount of dividend—that is, a 10 per cent. stock would be converted into twice the original amount of 5 per cent., or 2½ times the original amount of 4 per cent. stock. The variation in the rate of dividend for the unit change in price would also be reduced in the same proportion. Provided the total amount which can be paid in the way of return upon the investment is properly fixed, it is also true that the division of this total between interest on bonds and dividends on stock, either preferred or common, has no effect upon the interests of the community as a body of gas consumers. These points can thus be settled with a view solely to offering the greatest attraction to the investment of capital in the business consistent with the proper application and efficient administration of the system.

While the amount, character, and rate of interest borne by the securities authorized for immediate issue when a company is put under sliding-scale regulation is immaterial to the community, it is important that the total annual amount of interest and dividends be fairly and correctly fixed. It would seem that the most equitable method of doing this would be to pay no attention at first to the securities actually outstanding at the time, but to value the property of the company as a going concern, and determine

the proper rate of return upon this value. From these factors, the total annual return to be allowed is determined. The value as a going concern would necessarily include, in addition to the value of the plant and working capital, an allowance for the value of an established business, which, although it is as real an asset as a stack of retort-benches or a gasholder, is commonly called an "intangible" asset, because its value cannot be measured in exactly the same way as can those of the different parts of the physical property.

The rate of return to be allowed initially upon this value should be determined separately for each individual case, since no one rate can be taken as being fair under all conditions. In all cases, however, it should be higher than the rate at which bonds or preferred stocks of gas companies can be sold, since it is impossible to secure all the money needed for the establishment of a gas plant and its business by means of bonds and preferred stock bearing the ordinary rates of interest. Some of this money cannot be obtained unless there is a practical certainty that it will in the long run return more than the rate of interest that can be secured by investment in the bonds or preferred stocks of well-established companies whose net earnings available for interest and dividends are much larger than the amount of bond interest or preferred dividends. This larger rate of return is expected to be secured with ordinary management, and must be recognized, therefore, in the initial rate of return; the reward of management better than ordinary being obtained by the increase in the rate of return as the price of gas is reduced.

The rate of return upon the capital required for the extension of a well-established business, after the company has been put under the sliding-scale, will take care of itself if provision is made that the sliding-scale securities are to be sold by auction at or above a price to be fixed in advance of the sale, and that all premiums received from such sale at prices above the par value of the securities are to be applied to the extension of the business, but will not be entitled to a return. As the business becomes sufficiently established to be attractive to capital at a lower rate of interest, the price at which the stock can be sold will be increased, and the actual rate of return upon the money put into the property will decrease.

The fixing of the extent to which the rate of dividend on stocks under the sliding-scale shall change for the unit change in price of gas would seem to deserve more careful consideration than has been given to it in Great Britain. Under the provision that the rate shall always change one-quarter of 1 per cent. for each change of 1d. in price, the proportion borne by the total amount of extra dividend allowed the stockholders to the saving accruing to the consumers has grown steadily smaller, until in some cases it is as small as 1 : 6, or even 1 : 7. The result of this has been to decrease the incentive to achieve further reductions of price. There is no good reason why the savings effected by management better than the average should not be divided equally between the consumers and the company, not only at prices for gas near the standard price, but also at those far removed from the standard. This equal division cannot be exactly obtained by any fixed relation between change in rate and change in price, unless the amount of securities under the sliding-scale is always the same per 1000 cubic feet of gas sold. This amount will, however, vary from year to year, and it tends to decrease constantly, not only because the actual investment per 1000 cubic feet of gas sold tends to decrease as the business is built up in any given community, but also for the reason that, as the rate of dividend increases and the securities command a premium, part of the investment required will be supplied by the premiums, and therefore will carry no return.

In order that there shall be an equal division of the saving in spite of changes in the amount of sliding-scale securities outstanding per 1000 cubic feet of gas sold per year, it must be provided that a change of 1 cent in the price of gas shall carry with it a change in the percentage rate of dividend to be obtained by dividing 1 by the number of dollars of sliding-scale stock outstanding per 1000 cubic feet of gas sold in the year immediately preceding. Under such regulation, the company and the consumers would each receive one-half of any saving effected by the energy and skill of a management better than the average; and this equal division would continue, no matter how the relation between investment and sales varied, nor how this investment was divided between fixed-rate and sliding-scale securities. By the method outlined above, the sliding-scale system could be applied to the regulation of any gas company, with no disturbance of existing conditions, unless the company were earning more than a fair rate of return upon the value of their property; and even in such a case the disturbance would be no greater than if the ordinary form of rate regulation were applied.

In Great Britain, an official audit of the accounts of companies under the sliding-scale must be made, and their approval by the auditor obtained, before any dividends can be declared. In the only case of sliding-scale regulation in force in America, no such official audit is included, but the company are required to publish their accounts each year in one or more of the newspapers of the city, and they must have had the accounts audited by public accountants before making this publication. It would seem, therefore, that an official audit is not an inherently necessary part of the system.

Companies need not come under sliding-scale regulations when they are first incorporated. In fact, it would be a very difficult matter to accurately fix the basic quantities, upon which the success of the system depends, for a company starting business in a new territory. The business must have been carried on for a sufficient length of time to have become fairly well established before it is for the best interests of either company or community that the sliding-scale should be applied to it. In Great Britain, all the companies now under sliding-scale regulation had been in existence for many years before it was applied to them; and many of the smaller companies are still working as limited liability concerns without any statutory rights. The advantages to be derived from the application of the sliding-scale are sufficient to ensure that, if it has been generally and fairly applied to the established companies, the new ones that may be formed will take steps to come under it as soon as they have passed the formative period, and reached such a position that it is possible to fix a fair standard price and rate of dividend for them.

SCOTTISH JUNIOR GAS ASSOCIATION.

WESTERN DISTRICT.

Visit to the Greenock Corporation Gas-Works.

The members of the Western District Division of the Scottish Junior Gas Association, to the number of about forty, paid a visit to the Corporation Gas-Works at Greenock on Saturday afternoon. They were received by Mr. James M'Leod, the Engineer and Manager, Bailie Taylor, the Convener of the Gas Committee, Bailie Chalmers, the Sub-Convener, and other officials.

The works, which are about thirty years old, are situated at Inchgreen, at the eastern extremity of the town. They have railway communication at two levels, and a gateway in the northern boundary wall gives access to a quay jutting into the Firth of Clyde, by means of which sea communication is obtained. The retort-house is a spacious building, affording ample room for coal storage and for stoking machinery. The retort-bench, standing north and south in the centre, contains 204 retorts, 22 in. by 16 in., and 9 ft. 9 in. in length, set back to back. They are fired regeneratively, partly by the system of the West Gas Improvement Company, Limited, and partly by that of Mr. G. R. Hislop, of Paisley; and the Klönne system. The coal is brought in by rail at each side of the house, upon the stage-floor level, and is emptied by hand; the combined storage accommodation under cover being equal to 2800 tons. The coal is again lifted by hand and put into the breakers, from which it is elevated to storage hoppers, of which there are six, each of a capacity of 15 tons. The charging and drawing of the retorts is done by West's machines, driven by compressed air. Each charger carries about 2 tons of coal. The machines run with great smoothness, and with very little noise. It is found that men are easily trained to work them, and that after a short experience it is possible for the charging and drawing of about 140 retorts an hour to be accomplished. A hot-coke conveyor, furnished by the New Conveyor Company, Limited, serves each side of the retort-bench. The coke is quenched as soon as it leaves the retort-house; and it is then carried forward to the screens, which deliver the round coke into a gravity bucket conveyor and elevator, by which it is passed on to a range of receivers, of a capacity of 300 tons. They are arranged to discharge at the bottom, into railway waggons or carts, and some of them are fitted with an appliance for the bagging of the coke. The coke plant is steam-driven; the steam being provided by two Lancashire boilers, hand-stoked, and worked by forced draught; a pressure of 80 lbs. of steam being maintained.

Since Mr. M'Leod was appointed Manager of the works, he has had an engineering shop fitted up, which is found to be a great convenience. The machines are those of Messrs. Dempster, Moore, and Co., of Glasgow. Beside it is the steam-driven air-compressor—a West machine, which works automatically, and furnishes air at a pressure of about 350 lbs. In the exhauster-house there is a steam-driven exhauster by Messrs. Robert Laidlaw and Son, of a capacity of 3 million cubic feet per 24 hours; and, as a stand-by, two reciprocating exhausters, built by Messrs. Hanna, Donald, and Wilson, of Paisley, in 1872. The condensers are of the tubular pattern, and the scrubber is a Holmes vertical, of a capacity of 3 million cubic feet per 24 hours. For purification, oxide alone is used. There is a set of eight boxes, 20 feet square, and a new set of two deep boxes, 40 ft. by 30 ft. In the meter-house are two station meters—one furnished by Messrs. Laidlaw and Son several years ago, of a capacity of 100,000 cubic feet per hour, and the other by Messrs. James Milne and Son in 1866, of 70,000 cubic feet capacity, which is used as a stand-by. It is in contemplation to add a test meter to the equipment of the house. The gas is tested by a bar photometer, using the "Metropolitan" No. 2 burner and candles. The Corporation are allowed to supply gas of as low as 14-candle power; but they maintain an average of 20 candles—a Maxim-Clark carburettor being employed to enrich it up to this figure. The governor is on the Foulis system. There are three holders—two of 600,000 cubic feet, and the other of 400,000 cubic feet capacity. They are in cluster—an arrangement which allows the guide-framings to be braced together by girders at the top, giving vastly increased stability to the structures.

The sulphate-house stands in the north-east corner of the

works. Mr. M'Leod has had it reconstructed, and new plant—that of Messrs. C. & W. Walker, Limited, of Donnington—is in course of being fitted up. The plant is of the continuous type, and contains a 4-feet still, and a centrifugal pump. A bucket conveyor carries the sulphate to a lead-lined store which abuts upon the railway.

The works throughout were in a condition which made it evident that they are being well looked after. There is ample space in them, and the various parts are conveniently arranged for economical working.

At the conclusion of the inspection, in the course of which Mr. M'Leod and his assistants were assiduous in their attention to the visitors, tea was served to the party in an improvised tea-room in a store-room in the sulphate-house, which was brilliantly lighted by two Hands lamps with double inverted burners.

Bailie TAYLOR, who presided, said it had given the Corporation very great pleasure to meet the members of the Junior Gas Association, and give them an opportunity of looking over their works. He need not say that they did not regard theirs as being first-class gas-works. He supposed the members had, in their travels, seen something better than the Corporation could show them at Greenock. At the same time, he might say that, although they were fairly well satisfied with what they were able to do at present, they were looking forward to doing something better, under the able management of Mr. M'Leod and those associated with him. They had a smooth-working establishment. Everything at present was going on in an orderly and regular way.

Mr. W. M. MASON (Glasgow) explained that, owing to the President (Mr. D. Currie) having met with an accident the previous day, and the absence of the Vice-President, the duty devolved upon him to express to Bailie Taylor and the other members of the Gas Committee, the Association's appreciation of their kindness in allowing them to go through their works, and in providing excellent refreshment for them. While he might not be competent to speak about the appearance of the works at Greenock, he felt he could speak of the ability of their Engineer and Manager, whom he had known for many years. In Glasgow, Mr. M'Leod was the Senior Chemist in the Corporation gas-works; and he was always looked up to, by their Engineer and everyone else, as a leading light in the undertaking.

Bailie CHALMERS expressed concurrence in what had been said by the Convener of the Gas Committee. He said he considered they were only on the fringe of what they might expect from gas. He had been associated with gas-fitting for a very long time, and he could speak as to the vast strides which had been made in the uses of gas for lighting and heating during the past ten years or so. He believed the young men before him would, probably in the next ten years, make still more progress. He knew that when Mr. M'Leod obtained the ear and confidence of the Gas Committee, there was nothing they would refuse him, if they felt that it was going to enable him to make good gas, and, more especially, leave them a good surplus at the end of the year.

Mr. M'LEOD also expressed his pleasure at having the Association there, and asked them to accord a very hearty vote of thanks to Bailie Taylor for presiding.

This having been cordially agreed to, and acknowledged by Bailie Taylor, the gathering broke up.

Institution of Civil Engineers New Building.

A circular-letter from the Secretary of the Institution of Civil Engineers (Dr. J. H. T. Tudsbery) conveys the information that arrangements have now been concluded with His Majesty's Office of Works for the acquisition of a freehold site in Great George Street, Westminster, upon which will be built the new home of the Institution. The site is on the south side of the street, immediately opposite Delahay Street, and is bounded on the west by Prince's Street, which will be widened to the extent of 20 feet, so that the Institution building will occupy the east side of the street, and abut upon His Majesty's Stationery Office. It will consequently be within a few yards of Storey's Gate and the Institution of Mechanical Engineers. Competitive designs have been invited from six architects; and it is hoped that a definite selection will be made and an architect appointed early next year. It is expected that the building will be completed some time in 1912, by which time members may be able to be accommodated in their new quarters. It may be remembered that one feature of the new building is proposed to be a great hall, of a character similar to the halls of the Inns of Court. In it, general gatherings of engineers will be held, and memorials of distinguished engineers placed. The special building fund has so far been promised—£13,443 from 306 members; and the increase of the Institution's revenue is to be secured by a fee of £10 10s. on transfer to full membership, admission direct to which will mean an entrance fee of £21. In other respects, the subscriptions remain as before.

During his first six months' tenure of the position of Distribution Superintendent to the Hythe and Sandgate Gas Company, Mr. C. E. Rosevear has, his old friends in the London and Southern Junior Association will be glad to learn, connected up 149 new consumers, which is an increase of 15¾ per cent. There has also been laid under his supervision about 2¾ miles of new mains, which have brought within reach of the village of Saltwood the advantages of gas for lighting, cooking, and heating.

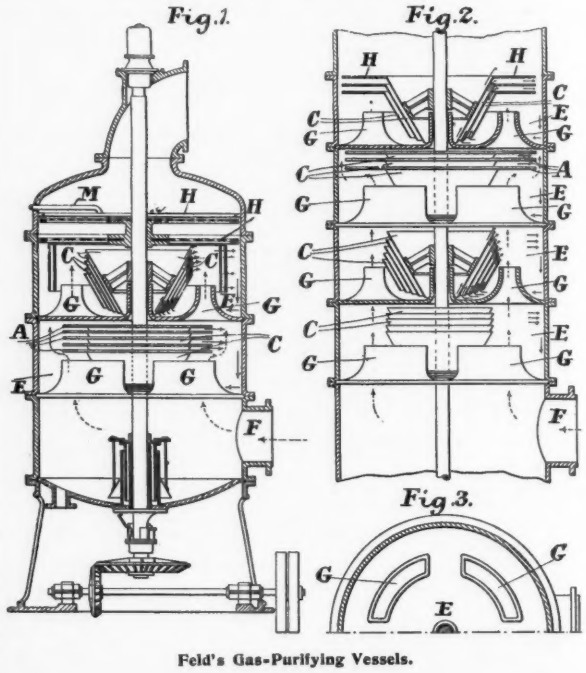
REGISTER OF PATENTS.

Subjecting Gases or Vapours to Action of Liquids.

FELD, W., of Hönningen-on-the-Rhine, Germany.

No. 15,683; July 23, 1908.

This invention has for its object to provide simplified apparatus of the character described in patent No. 11,206 of 1905.



Feld's Gas-Purifying Vessels.

Fig 1 is a vertical section of one form of the apparatus, fig. 2 shows a modification, and fig. 3 is a half cross-section of one of the vessels showing the gas-passages.

As shown by fig. 1, the apparatus consists of vessels E, one above the other (each for holding liquid), the bottoms of which are provided with gas-passages G, which also serve as overflows for the liquid (although special overflows may be provided if desirable). Passing down the centre of the apparatus is a rotatable shaft, driven (say) by gearing, as shown. Secured to the shaft are concentric funnels or pipes C, each carrying at the top an annular plate A, as shown in the lower vessel, or without one, as shown in the upper vessel. The funnels or pipes C at their lower ends dip into the liquid in the vessels E, and are arranged concentrically; so that there are spaces between them for the passage of liquid up between the funnels or pipes and on to, and off from, the annular plates (when plates are used). The passage of liquid is induced by centrifugal action due to the rotation given to the several parts by the shaft. The liquid is thus thrown off from the upper ends of the funnels or pipes, or from the annular plates, so as to form a fine spray throughout the cross-sectional area of the space between the upper edges of the funnels or plates and the interior of the vessels E. The gases enter from below at F, and are thoroughly subjected to the action of the sprayed liquid—passing, as they do, through sprayed liquid only. After the gases pass from the uppermost division of the apparatus, they enter perforated or reticulated rotating screens H (two screens are shown), which are arranged inside the upper part of the apparatus; so that the gases are compelled to pass through them and thence to the outlet. The screens are to separate any liquid which may be carried up with the gases or vapours. The screens are secured to, and rotate with, the shaft. The liquid is admitted to the upper vessel through any suitable inlet (such as that shown at M, for example, which may lead the liquid upon the middle of the uppermost screen) and pass off through an outlet at the upper part of the apparatus.

The construction shown in fig. 2 is generally like fig. 1, but with a larger number of vessels. There are shown in the two upper vessels the rotating perforated or reticulated screens as being carried by the funnels C, at the top, which combines the action of the plate A with the screen H.

Gas-Producer Apparatus.

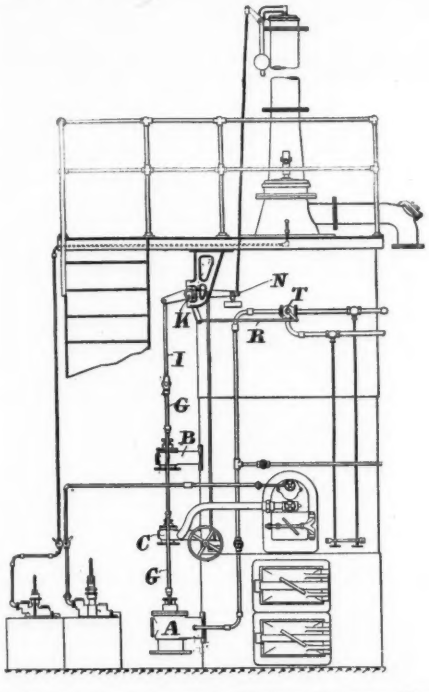
TULLY, C. B., of Wood Green, N.

No. 22,851; Oct. 27, 1908.

This invention relates to apparatus for the production of gas suitable for heating and illuminating purposes, and particularly to plants in which the gas-producer comprises a lower fuel-chamber and a vertical retort for the decomposition of coal, tar, or the like, heated externally by combustion of gas derived from the lower fuel-chamber; air being supplied through a primary valve to the fuel-chamber and through a supplementary valve to the combustion-chamber pertaining to the retort. The object of the invention is "to provide a system of connections whereby the simultaneous opening or closing of the primary and supplementary valves together with the stack valve causes also a valve to be operated to supply steam to the lower fuel-chamber while the valves are closed, and to cut off this supply and direct the steam to the

stack to which the stack valve pertains when the valves are open, as happens in a known but different type of gas-producer having only a primary air supply."

Two arrangements of valve connections according to the invention are illustrated in the specification, with different arrangements of valve connections.



Tully's Valve Arrangement for Methane-Hydrogen Plant.

In the arrangement shown, the primary-air valve A and secondary-air valve B are of the ordinary mushroom or disc type, as is also a subsidiary valve C, which is used for supplying air to the generator for a special purpose described in patent No. 24,803, of 1908 (below). The three valves are operated by crossheads, adjustably mounted on a pair of vertically movable stay-rods G carried by a fourth crosshead suspended from a point intermediate of its length by a rod I attached to an arm secured upon a rock shaft K, which is mounted in bearings near the upper end of the generator, and provided at one end with a weighted arm N connected by a rope to the stack-valve, and at the opposite end to an arm connected by a rod R to the arm of a three-way cock T in a system of steam-piping which has branches leading respectively to the laterally arranged stack surmounted by the stack-valve and to the fuel-chamber of the generator through the primary-air supply inlet.

The movement of the parts may be effected by directly rocking the shaft K through a hand lever extending sufficiently far to enable it to be operated from above the platform shown, or the movement may be imparted through any mechanism within the reach of an attendant at the base of the plant.

Gas-Producers.

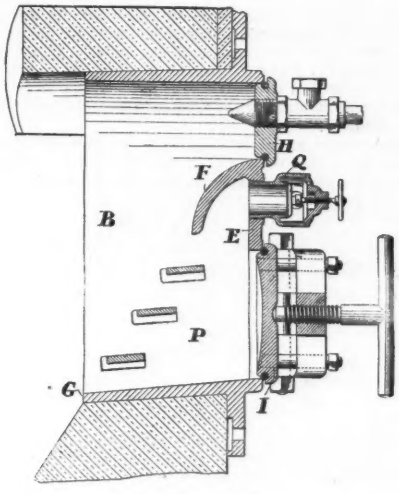
TULLY, C. B., of Wood Green, N.

No. 24,803; Nov. 18, 1908.

This invention relates to apparatus for the production of gas in which heavy liquid hydrocarbons—such as tar—are introduced into a generator and caused to impinge against a bed of incandescent fuel for the purpose of being decomposed thereby. The object of the invention is to provide means whereby, in the act of "blowing" the generator, a supplemental supply of air is caused to enter it in the region of the space where deposit is liable to be formed, and in this way cause the removal of any deposit by combustion; the means being so constituted that recourse can be had to devices for the mechanical removal of the deposit if this should be found necessary at any time.

The wall of the generator is provided at points around its periphery with openings, in each of which is fitted a frame B having a curved top surmounted by an arch in the usual manner. The bottom of the air-receiver is inclined slightly. Intermediate of the top and bottom of the frame is a transverse bar E, having an overhanging portion F curved towards the lowermost inner edge G of the frame. The spaces which exist above and below E are closed by doors or covers H I, hinged to the frame or otherwise removably secured to it; the upper door carrying a nozzle J for injecting the hydrocarbon. Between the lower edge of the curved portion F of the bar and the lowermost inner edge of the frame B, and so that their forward edges are in a plane between such edges, are arranged (say) three grate-bars O, which partially overlap one another and are also inclined downwardly towards the interior of the generator, but at a lesser angle than the plane containing their forward edges—thereby constituting a louvre-like wall. The bars may be formed integrally with the frame, or (as shown) be removably fitted therein, as found most expedient. The air supply to the receiver P thus constructed, may be by way of openings in a valved case Q screwed into the transverse bar of the frame; and the valve is adjusted by a hand wheel and screw, so as to regulate the supply of air to the receiver.

The supply of air to the valve-case Q may—as described in patent No. 22,851 of 1908 (above)—be controlled by a separate valve so interlocked



Tully's Gas-Producer.

or interconnected with the valves used for supplying and cutting off air, steam, and hydrocarbon to the gas-producer in a predetermined order that air will be supplied to the receiver P when the valve-operating mechanism is actuated to cut off the supply of steam and hydrocarbon to the fuel in the producer and admit air thereto for again raising the fuel to incandescence.

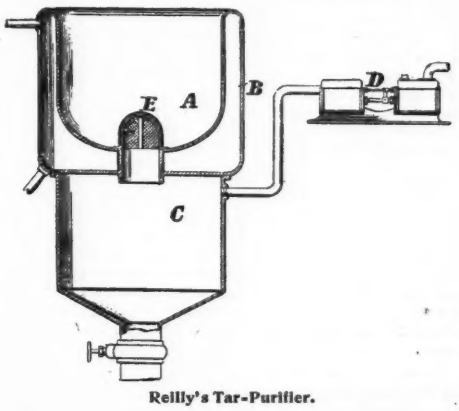
Purifying Tar.

REILLY, P. C., of Indianapolis, Ind., U.S.A.

No. 22,853; Oct. 27, 1908.

This invention relates to "the treatment of tar so as to remove a portion of its constituents by mechanical means and render the remainder more useful than the whole tar would be for such purposes as impregnating wood." As a "cheap, rapid, and efficient" method for separating such suspended matter from tar, the patentee says he has found that if the tar be heated to a temperature of from 150° to 250° Fahr., and then pressure be applied to the liquid, either by the creation of a vacuum below the filter or by artificial pressure above the filter, it is possible to cause "a satisfactory, and probably complete, separation of the suspended matter from the tar, rapidly and cheaply, by mechanical filtration alone."

The products of the process are principally the free carbon which remains upon the one side of the filter, and the other constituents of the tar which pass through the filter. Each of the products obtained is claimed as "a new article of manufacture," and each has specific commercial value, and may be applied to uses which are "new and distinctly advantageous." The residue remaining upon the filter, consisting substantially of free carbon, is available for any of the uses for which finely-divided carbon is employed—such as the manufacture of paint, electric light carbons, battery electrodes, and other similar uses. Further, the residue has marked differences from that obtained by other processes and ordinary carbon.



Reilly's Tar-Purifier.

The filtrate which passes through the filter may be employed for the manufacture of hydrocarbons from it by distillation. The filtrate may also be employed for impregnating wood, as it is found not to contain any free carbon; and when compared with oils heretofore derived from tar, it is relatively not volatile. At ordinary temperatures, it has a gravity of about 1·05 to 1·20, which is greater than that of any oil heretofore derived from coal tar, and can, by the usual methods of impregnation, be forced into and through the pores of wood, so as to fill the pores and interstices of the wood, and make it antiseptic and waterproof. This process has been made the subject of a companion patent—No. 22,854. The filtrate thus derived contains practically all the oils of the original tar in a liquid state, including the anthracene contained in solution.

A simple apparatus by which the process can be carried into operation is shown. The vessel A, in which the tar is placed, is provided with a steam-jacket B, for the purpose of heating the tar to the desired

temperature. C is a receiving vessel closed, except for its opening into the vessel A and to the air-pump D, which is used for the purpose of reducing the atmospheric pressure in the vessel C. E is a filter in the bottom of the vessel A preferably made of conical form for the sake of strength, and covered with wire cloth, over which is placed a finer filter of textile cotton cloth or the like, of a suitable mesh—preferably double twilled muslin.

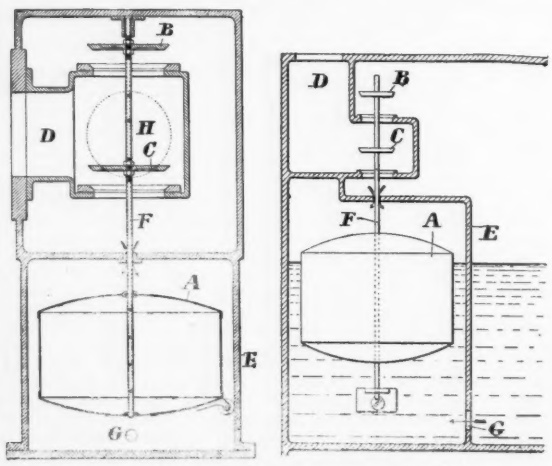
The vessel A is open to the atmosphere. It is partially filled with tar, which is heated to a temperature of 150° to 250° Fahr. The air-pump is started, and the pressure in the tank is reduced to about 25 inches of mercury; but the greater the vacuum, the more rapid the process. The pressure may be augmented by closing the upper tank, and applying air pressure or steam pressure to the top of the tar, or the vacuum below the filter may be wholly dispensed with, and pressure above relied upon. The tar will then flow slowly, but fast enough for practical purposes, through the filter, and the free carbon will be left upon the filter.

Gas-Meters.

GLOVER, W. T., of Oldham, and METERS LIMITED, of Manchester.

No. 27,268; Dec. 15, 1908.

This invention relating to wet gas-meters has for its object to provide means for neutralizing the effect upon the meter inlet-valve of any sudden increase of pressure in the main.



Glover and Meters Limited Compensating Gas-Meter.

The illustrations represent the float and inlet valve box of a meter, in sectional elevation, when arranged separately from the meter, or within the meter casing itself.

A is the float connected to the inlet valve for controlling the flow of gas through the meter; but, instead of employing an ordinary single valve disc, it is proposed to secure upon the float spindle two valve discs B C, of equal area, which act in the manner of an equilibrium valve, and so are unaffected by any changes of pressure in the inlet pipe D. If, however, the float chamber E were freely open to the incoming gas, as usual, a sudden rise in pressure in the inlet pipe, while not directly affecting the valve, would act upon the water and float and tend to momentarily displace the water and lower the float. This action would result in the closing of the valve discs if the latter were already near to their seating surfaces—due to the lowering of the water level in the float-box by waste or other ordinary cause. It is therefore proposed to have a small gas-inlet aperture around the float stem F where it passes through the casing, as indicated by the arrows, and a water-inlet G near its lower end—below the water-level in the meter.

When a sudden rise in pressure occurs in the main, the valve B C is unaffected (being of the equilibrium type) and, owing to the small aperture round the stem F of the valve, the gas cannot act as quickly upon the water in the float-chamber E as upon the water in the meter, to which it gains access through the outlet pipe H. Hence the effect of the increased pressure is to force the water into the float chamber E, thereby raising the float and further opening the equilibrium valve. But as the pressure upon the surface of the water in the float-chamber and in the meter soon becomes practically uniform, the water level is quickly equalized and becomes the same as inside the measuring drum of the meter.

Automatic Igniters and Light Extinguishers.

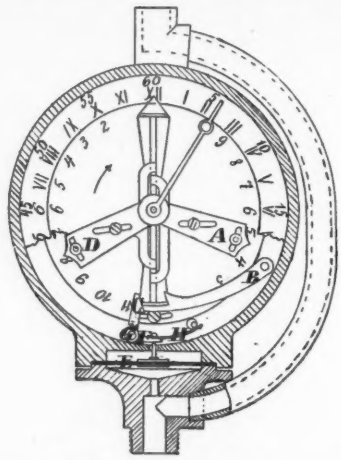
BRÖNDUM, M. W., of Aarhus, Denmark.

No. 24,793; Nov. 18, 1908.

This device, for the automatic ignition and extinction of lights, is actuated by a clockwork, of the kind in which, in accordance with the varying hours of daylight, two release arms which may ignite or extinguish the lamps receive an additional movement. This invention consists in the provision of means whereby the release arms may be influenced not only by the clockwork, but also by gas or pneumatic pressure, or by an electric current, in such a manner that, within given times, an ignition or extinction of a number of lighting appliances may take place; an alteration of the ignition time of the lighting apparatus outside these limits, however, being made impossible.

The invention, as made for gas-lamps, is illustrated as applied to apparatus constructed in accordance with patent No. 10,715 of 1908. The release arms, for igniting and extinguishing respectively, do not consist of two parts as is the case in the earlier patent, but each of them is made of one part only.

The operation of the apparatus is as follows: If the release arm A, with its pin, has forced down the lever B, the detent C, with its book, will fall upon, and arrest, the lever. The first part of the releasing action is thus effected. If the lever be released by the pin about half-an-hour earlier than the normal time of ignition, it is arrested by the detent, which latter, however, reaches so far in an upward direction that it enters the course described by the release pins. If the pin on A then, about half-an-hour after the normal ignition time reaches the detent C, it will push the latter aside, thus completely releasing the lever B, and thereby igniting the lamp half-an-hour after the normal ignition time. The extinguisher D will act in a like manner.



Brondum's Automatic Gas Lighter and Extinguisher.

Between the first and second part of the releasing action—which, in the example shown, may take place about half-an-hour previous to about half-an-hour after the normal time of ignition or extinction—the second part of the releasing action can be effected by a suitable increase of the gas pressure, whereby the membrane E, and with it the arm F, are forced in an upward direction. The shaft G will be turned a little and, by means of its projection and pin, will turn the detent C so far that the lever B is released. If, now, the pressure is repeatedly increased—for instance, by a return wave of pressure, or because not all the lights have been ignited on the first increase—the repeated turning of the shaft G would have no effect. Likewise, an increase of pressure before or beyond the half hour of the normal ignition time—that is to say, before or beyond the time in which the pins are situated between the nose of the lever B and the detent C—would have no effect, as the lever is arrested by the detent only during the time of the first and second part (or half) of the releasing action. By tensioning the spring H, pressure can be produced enough to turn the detent sufficiently aside to release the lever. The detent is thereupon returned into its operative position to the right by means of a spring or the like (not shown), or the detent may advantageously be provided with a counterweight adapted to effect the return movement.

If an invariable, uniform releasing action—for instance, at 11 or 12 o'clock p.m.—is desired, it can be effected by providing the dial with a release pin at the desired point.

Gas-Purifiers.

MILBOURNE, R. J., of Muxton, near Newport, Salop.

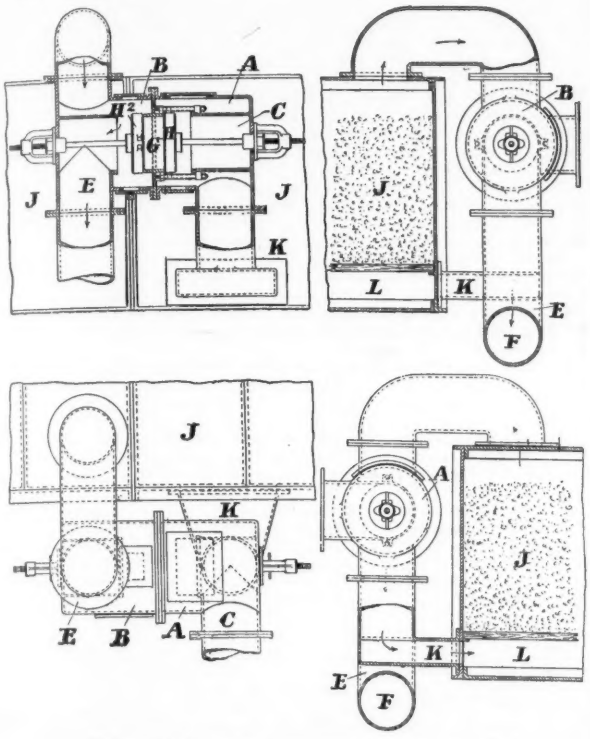
No. 1630; Jan. 22, 1909.

This invention relates to the valvular arrangements of gas-purifiers, as described in patent No. 11,356, of 1901; the object being to simplify the construction and also, if desired, to render the valves capable of being operated from the sides instead of from above. The present valve arrangements are more especially intended to be placed outside the purifiers, whereas those described in the prior patent, although capable of use outside the purifiers, if desired, were more especially designed for use inside.

In each valve arrangement as illustrated, the chambers A and B, into which the pipe C from the inlet main D, and from which the pipe E to the outlet main F, respectively open, are arranged in horizontal line with each other; and the opening G, between the chambers, is surrounded by valve-seatings—one in each chamber. In horizontal line with the opening G, is, in the chamber A, the open end of the inlet pipe C, having a valve-seating around its edge; and in the other chamber B is the open end of the outlet pipe E, having also a valve-seating around its edge. There is sufficient space between the respective valve-seatings to allow of the movement of the valves H H^2, which are arranged vertically; the one valve H being between the valve-seating on one side of the opening G and the valve-seating on the end of the inlet pipe C, and the valve H^2 being between the valve-seating on the other side of the opening G and the seating on the end of the outlet pipe E. The valve spindles pass horizontally in reverse directions out through stuffing-boxes on the reverse sides of the valve arrangement; the valves being operated by screwing, or otherwise, so that they can be moved horizontally to open and close the inlet and outlet pipes and the opening between the two chambers to control the flow of gas, after the manner in which the valves control the flow of the gas in the arrangement according to the prior patent.

The ends of the inlet and outlet pipes within the two chambers are formed by elbow continuations passing through the walls of the chambers, but preferably cast in one with the respective chambers as shown. The chambers A B are in communication with the purifiers by passages which answer the same purpose as the inlet hood and outlet

column described in the 1901 patent; these passages and chambers being simply means for continuing the passage-ways for gas between the valve arrangement and the lower and upper parts of the purifiers respectively.



Milbourne's Valvular Arrangement for Gas-Purifiers.

In the arrangement shown, the outlet bend or box leading from the purifier is connected to the chamber B, so that it leads from an opening in the top, or permanent cover, of the purifier J to the chamber; and there is a box K, in communication with the chamber A, secured to the outside of the purifier and communicating by an opening with the space underneath the lowest tray supporting the purifying material—the opening being preferably made long and narrow, and the box K being correspondingly shaped, so that the space is of small depth. By this arrangement—dispensing, as it does, with inlet hoods and outlet columns inside the purifiers—the purifiers "are kept clear of unnecessary obstructions, and the space saved is available for purifying material." The last chamber A of the series communicates with the passage M leading back to the first purifier of the series.

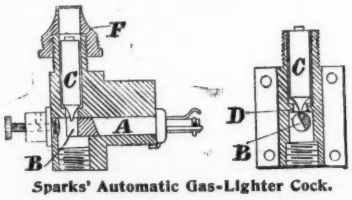
Cocks for Automatic Gas Light-Controllers.

SPARKS, E., of Tufnell Park, N.

No. 2630; Feb. 3, 1909.

This invention has reference to a removable lift plug having a conical point which is raised, when the plug is to be lifted, by a part-revoluble shaft (having operating cams) turned over at intervals by clockwork mechanism. The arrangement has been designed for use in conjunction with the mechanism described in patent No. 11,751 of 1902.

The stem is adapted to be part-rotated by clockwork mechanism in the manner in which the hollow plug of the cock described in patent No. 27,005 of 1908 is turned. There a conically pointed lift-plug, having a cylindrical body, was shown mounted in a casing and adapted to enter its seat when permitted to fall. The stem was provided with a transverse flat and an operating cam or lug in such a manner that, when the weighted lever was at one end of the stroke, the flat was below the apex of the conical plug so that the plug was in its seat, and when the weighted lever was at the opposite end of its stroke, the cam was below the apex of the conical plug and held the latter out of its seat.



Sparks' Automatic Gas-Lighter Cock.

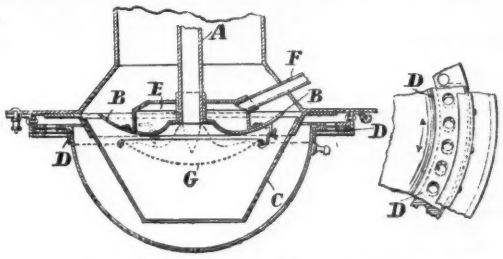
In the preferred form of the invention (as shown), instead of a transverse flat and projecting cam, the end of the stem A is cut away to form the operative cam B. The lift valve C, mounted in its seat D, is arranged immediately over this end of the stem, so that, upon turning it by means of the weighted lever to the "gas-on" position, the plug or valve will be lifted by the cam to permit the passage of gas, and when the cam is brought from under the point or apex of the plug by the part turn of the stem in the opposite direction, the plug falls and the gas-passage is closed. The valve is returned to its seat by gravity and it may, when desired, be removed out of position after unscrewing the perforated cap F.

Inverted Incandescent Gas-Lamps.

KÜTTNER, E. W., of Berlin.

No. 3348; Feb. 17, 1909. Date claimed under International Convention, Feb. 17, 1908.

The patentee's initial claim is for an inverted incandescence gas-lamp, having a saucer or plate-shaped incandescence body, characterized by means for throttling to a high degree the outer air of combustion fed towards the incandescence body, and by a flared flame-spreading body surrounding the lower end of the mixing-tube and adapted to keep the chimney draught from those parts of the incandescence body which are covered by the flame-spreading body.



Kuttner's Inverted Lamp with Flat Mantle.

The illustration shows a vertical section of the lamp and a part plan of the regulating device for the secondary-air feed.

A is the mixing-tube for feeding the mixture of gas and air—in this case arranged within the chimney of the burner. The mouth of the mixing-tube is provided with the covering body or flame-spreader B. The outer globe C and the second glass (open at the bottom) are attached to the chimney; the former being suspended by a ring fixed to the chimney, and carrying an annular member furnished with holes. A rotatable ring D is provided beneath the inner ring, being also provided with holes which may be caused to register more or less with the other holes, so that more or less air will be allowed to enter the outer globe. Above the flame-spreader a hollow chamber E is provided, which communicates with the outer air by means of a pipe F, passing through the chimney wall, and with the mouth of the mixing-tube by means of holes, through which the air can pass to the under side of the spreader. The incandescence body G is entirely covered at the top by the spreader, and is carried by a ring suspended by hooks from hooks on the spreader. The glass, which is open at the bottom, tapers towards the lower end; so that the incandescence body is partially closed from below—thus forcing the external air for supplying combustion against the underside of the incandescence body, owing to the suction caused by the chimney, and thus "assisting the desired flat formation of the flame."

APPLICATIONS FOR LETTERS PATENT.

25,690.—GIBBONS, G. B. A., MASTERS, R., and WALKER, T. B., "Charging gas-retorts." Nov. 8.
25,775.—UNWIN, J., "Internal combustion engines." Nov. 8.
25,776.—BETTS, S., "Attaching inverted mantles." Nov. 8.
25,791.—SUTHERLAND, A. G., "Meter diaphragms." Nov. 8.
25,795.—SHEPHARD, J. W., and BROWN, G., "Hollow brick lamp which can be lit or illuminated by either the ordinary gas-mantle or electric bulbs and used for lighting the names of streets or advertising purposes." Nov. 9.
25,862.—GRIGSBY, W. R., "Inverted burners." Nov. 9.
25,867.—MORRIS, H. J., "Gas-meters." Nov. 9.
25,993-4.—HARRISON, B. S., "Gas-tight joints." Nov. 10.
26,068.—CAMBRIDGE, A. S., "Generating gas." Nov. 11.
26,073.—HOYLE, J. S., "Lighting burners." Nov. 11.
26,107.—LAMPLOUGH, F., "Rotary blower or exhauster." Nov. 11.
26,124.—OTTO AND CO., G. M. B. H., "Removing tar from hot gases." Nov. 11.
26,149.—ANDERSON, D., "Cocks and switches." Nov. 11.
26,162.—HELPS, G., "Gas lamps and burners." Nov. 11.
26,169.—GRICE, H. J., "Suction plants." Nov. 12.
26,197.—WHITELEY, R. H., "Gas-turbine." Nov. 12.
26,211.—BLACK, E., "Artificial fuel." Nov. 12.
26,217.—SCHNORRENBERG, L., "Distance igniters." Nov. 12.
26,271.—BACK, E., "Fuel for gas-fires." Nov. 12.
26,277.—COWAN, W., "Gas-meters." Nov. 12.
26,282.—ANDERSON, D., "Gas-lamps." Nov. 12.
26,302.—HUTCHINSON, C. H. & B. G., "Torch-lighting of inverted lamps." Nov. 13.
26,318.—O'CONNOR, H., "Inverted burners." Nov. 13.
26,349.—FORTI, V., "Igniting and extinguishing gas-burners." Nov. 13.
26,370.—BETTS, S., "Inverted mantle carriers." Nov. 13.

Public Lighting of Westward Ho.—Complaint was made at the meeting of the Northam Urban District Council last week of the low illuminating power of the gas in the public lamps at Westward Ho. It was said to be due to some difficulty with regard to the purification of the gas; and Mr. J. Harris explained that a change had been made from lime to oxide. He had told the Gas Manager he thought the new method was being so used as to reduce the illuminating power of the gas. It was decided to call the Gas Company's attention to the matter.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Proper Allowance for Depreciation of Gas Plant for Income-Tax Purposes.

Sir,—As the question of the recent circular issued by the Board of Inland Revenue to Surveyors of Taxes, with reference to the disallowance of deductions for depreciation on gas plant, is one which seriously affects gas companies, I am instructed by Mr. H. E. Jones, the Chairman of this Association, to forward to you a copy of a letter which the Association has received from Mr. Cash upon the subject, and trust that you will be able to find room for it in your columns.

Fred. E. Cooper, Secretary
Gas Companies' Protection Association.

5, *Victoria Street, S.W., Nov.* 18, 1909.

[Enclosure.]

To the Secretary of the Gas Companies' Protection Association.

Dear Sir,—I beg to refer to the interview which I had with your Committee on the 7th of October last, when the question of the circular recently issued by the Board of Inland Revenue to Surveyors of Taxes, as regards depreciation allowances to gas and water undertakings was discussed.

As I informed you, I have since been in communication with the authorities at Somerset House; and I have had the advantage of more than one interview with certain of the officers there—being the Superintendent Inspectors of Stamps and Taxes—on the whole question. These gentlemen (who extended to me their usual courtesy) were good enough to put before me the views of the department on the question; and I think it would be useful to the members of the Association, and others interested, for me to here state the views thus expressed on behalf of the Board.

I am informed that the circular was issued as the result of numerous interviews which the department had had with certain representative bodies acting on behalf of statutory undertakings.

The question arose, in the first instance, with regard to tramways; then with regard to electric light undertakings; and, subsequently, gas and water undertakings were also brought in.

The aim of the department, throughout, has been to obtain uniformity in assessment of these kindred undertakings; but the officials admit that the gas companies were not specially represented at the conferences, as the existence of your Association was unknown to them, and have expressed their regret that some representative body, other than corporation officials, was not there to represent the gas companies, so that any argument which they desired to adduce might have been discussed.

The department rely on the general principle that a trading concern cannot be allowed, in the assessment of its profits for income-tax purposes, for both renewals and depreciation; and this proposition, I think, no one would venture to dispute. Further, the department suggested that, by their allowing for all renewals, as they take place, the companies are getting all they are entitled to; and that, in old established companies, it made very little difference whether the allowance was made under one head or the other, and that any question of estimated life—involving, as it might do, variation in practice in different parts of the country—is avoided, and that actual results, instead of estimates can, therefore, be dealt with. Further, they state that, where there might be difficulty in assessing the amount of the renewals—as, for example, with regard to stoves, where the numbers and varying types at different prices complicate the question—they would be prepared to deal with the matter upon generous lines and estimate the renewals on average prices, dealing with total numbers in use by consumers. They, therefore, invite the gas companies to come in on these lines and accept the arrangement outlined in the circular.

On the other hand, the department admit that no company can be compelled to come in, but that the right of appeal to the Commissioners under the Income-Tax Acts remains with the company in each case.

I ventured to suggest that a distinction might be drawn between an allowance for depreciation on fixed plant—such as buildings, retorts, gasholders, &c., where the general practice has been to charge renewals as they fall due—and depreciation of short-life plant, including under this head meters, stoves, and internal house fittings. But I was informed that there was considerable doubt as to whether—so far, at least, as stoves and house fittings were concerned—this was machinery and plant at all within the meaning of the Income-Tax Acts; and, therefore, no depreciation could be allowed under the Statute, but only actual repairs and renewals.

I venture now to add my personal opinion with regard to the position created under the circumstances detailed above.

I would say, at once, that I would not recommend the gas companies to accept the suggested arrangement proposed by the department, so far as it relates to short-life plant—such as meters, stoves, and fittings. Having regard to the large development of business, of late years, by gas companies—particularly in respect of prepayment installations—I see no reason why a company should be asked, for income-tax purposes, to defer the charge against revenue, for renewals, until these actually take place, and to depart from what is a well-established principle of making an annual allowance for depreciation, as recognized by the Income-Tax Acts, and allowed to all traders.

Expenditure on internal fittings in the houses of prepayment consumers is of an extremely doubtful value, and, indeed, may be regarded almost as a charge on revenue account spread over a number of years. Many of the larger companies have kept this expenditure out of their capital accounts, and treated the sum spent as an asset in the balance-sheet while it is being written off; and it should certainly, in my opinion, be extinguished as soon as possible, because the realizable value of the asset is extremely small.

Apart from the subject of income-tax, there can be no question whatever as to the desirability, and, in fact, necessity, of a gas company making provision out of current profits for depreciation which is going on continually, and which will have to be met when the plant in question has to be renewed, either because it is worn out or because it is superseded by something more modern or better suited for the purpose for which it is employed than the apparatus employed at the date of installation.

A gas company which was conducted on other lines, and which divided as profits the rents authorized by Parliament to be charged for the hire of meters and stoves, and the extra charge collected through the slot-meters as a provision for deterioration of the fittings and other appliances provided by the company, would be embarking on a system financially unsound and certain to lead to disaster.

If the income-tax authorities demand, as they do require, that the tax shall be paid on these receipts, they should allow, on the other side, the expenditure which this class of receipt is authorized and designed to cover. A mere plea for uniformity or simplicity should not be allowed to outweigh the reasonableness of this contention.

Bound up with this question is a further question, arising out of the increased use by gas companies, under modern methods, of labour-saving machinery. Much of this machinery is of a quick-running type, with considerable wear and tear; and I see no reason why a gas company should not claim and be allowed, like any other trader, for depreciation on assets of this nature.

It is admitted that, if the gas companies decide to adopt this view, they have each the right to appeal to the Commissioners against an assessment which ignores depreciation. But, personally, I regret the issue by the department of the circular in question, as it is a direct instruction to surveyors, and thereby many companies may be compelled to appear before the Commissioners where, in past years, there has been no difficulty in arriving at an equitable basis of assessment with surveyors.

It is agreed, on all hands, and, indeed, urged on gas companies that it is highly desirable, in the interests of the shareholders and consumers alike, that capital expenditure should be kept at as low a level as possible, and all proper writings-off are to be welcomed as part of a policy in this direction. It would be manifestly unjust, under these circumstances, that a corresponding allowance for income-tax purposes should not be allowed to the companies.

In conclusion, I would point out that, if the accounts are prepared on the lines suggested by the department, no provision is made, or allowed, for the fact that, at any given date, all the meters, stoves, fittings, and other appliances, out on hire, are not new, but have exhausted part of their ultimate life. Under these circumstances, I should have no hesitation in recommending any company, where the local surveyor has declined to make proper allowances for depreciation, that an appeal to the Commissioners should be prosecuted, and arguments on the lines given above urged in support thereof. Should such an appeal fail, then I am of opinion that steps should be taken to carry the question, on a stated case, to the High Court for settlement.—I am, &c.,

90, *Cannon Street, E C., Nov.* 8, 1909. (Signed) Wm. Cash.

Lamson's American Institute Paper.

Sir,—Had the paper entitled "A Pound of Coal"* been read by Mr. Lamson, as per programme given out for the recent meeting of the American Gas Institute, the writer would not have felt justified in asking for space for the following letter. But because of events not in his control, he was obliged to leave the meeting before either Mr. Lamson's or Mr. Africa's paper was reached.

Almost at the beginning of his admirable paper, Mr. Lamson uses the following quotation: "A prominent gas engineer stated that, in view of the recent results obtained in vertical retorts, he thought it waste of time to discuss horizontal retorts in any shape, with or without machinery, for large, medium, or small works, and the sooner all concerned wake up to these facts, the better for these companies and their stockholders." While the writer disclaims any eminence whatever, yet as there can be no doubt as to whom was meant by the author of the paper, the subscriber does feel that it would be only fair play to submit a few statements of facts to make clear his position and to defend the views quite rightly attributed to him by the highly-esteemed author of the paper.

All who know Mr. Lamson will join the writer in saying that the accuracy of the author's figures, his honesty and integrity of purpose, or his professional skill and eminence can never be doubted. But notwithstanding all of this, Mr. Lamson may be somewhat mistaken in his deductions, as he himself appears not to be altogether certain when saying: "The paper is not to be considered as a final statement, as I have said before. We have carried on many experiments, and are constantly developing new results. We will therefore call the paper a report of progress." Should eventually the very ample mains of the new works at Worcester be found closing up with pitch, might we hear of this? The author, by the text of his very interesting paper, would lead the reader to infer that not only the "prominent gas engineer" whom he quotes, but all gas engineers of the past or present generation—and not sparing himself either—were woefully deficient in knowledge of one of the most important branches of their profession, until the wonderful discovery was made by means of the new (and splendid) retort-house at the Worcester, Mass., Gas-Works.

The subject of remarkable results from coal which did not yield so much before reminds the writer strongly of a portion of Mr. Samuel S. Clement's ("Mark Twain") story "Life on the Mississippi," Chapter XIII.—"A Pilot's Needs." As the story points a moral or lesson, permit me to quote a few lines from it. "Mark Twain" had become a good steersman, and having been left alone in the pilot-house by Mr. Bixby, his "Boss," to test him, he became uneasy on seeing a group of the boat's officers and passengers gathering on the deck below him, while the Captain pointedly asked "Where's Mr. Bixby?" They were crossing a particularly deep portion of the river at the time. "Twain,"

* This paper was, in great part, reproduced in the "Journal" a fortnight since, p. 392.—Ed. J.G.L.

becoming alarmed, called for the leads-men for soundings—the whole culminating in his getting so excited as to "loose his head" and begging the engineer, through the speaking tubes, to "back her; if you love me, Ben, back the soul out of her"—when he heard the door behind him closing gently, and there beheld Mr. Bixby. The following conversation then took place: Twain: "It was a fine trick to play on an orphan, wasn't it? I suppose I'll never hear the last of how I was ass enough to heave the lead at the head of 66." Bixby: "Well, no, maybe you won't, maybe—in fact, I hope you won't, for I want you to learn something by that experience. Didn't you know there was no bottom in that crossing?" Twain: "Yes, Sir, I did." Bixby: "Very well then, you shouldn't have allowed me or anybody else to shake your confidence in that knowledge. Try to remember that." I have said that Mr. Lamson's figures may be accepted as absolutely accurate, and that his personal and professional standing is of the highest order. Upon what grounds, then, can the practical value of the operations at the new Worcester retort-house be called in question or give reasonable grounds for doubt?

The writer visited the plant in June last, and was delighted with all he saw at the time. He had never expected to see such perfection in any retort-house containing only horizontal retorts operated with stoking machinery; and to others who asked about what he had seen, he described it as being an old horizontal coal-gas retort man's dream, as Mr. Lamson had asked visitors not to speak or write about what he so freely and courteously permitted them to see until he had written his own paper upon the subject. The design, execution, and operation of the retort-house named above reflect great credit upon the contracting firm—the Riter-Conley Company, especially the President of the same (Mr. Carpenter)—and upon Mr. Charles Dudley Lamson, the President of the Worcester Gaslight Company, and all who may have been associated with them in the conception and final results obtained, as so interestingly described in the paper under review.

But let us now consider these remarkable results a little closer, and try to understand if everybody in the practical class of gas engineers past and present really were so ignorant as to what could be obtained from a pound of coal until a Pittsburgh firm of gas apparatus manufacturers discovered the real facts, and, by means of the Worcester retort-house and Mr. Lamson's excellent paper, convinced the world—if not all of us—that we actually all this time did not know what we were doing or talking about. The Worcester retorts are "throughs," ⌂ shape, and 15 feet long, with an ascension pipe at one end only—the charging end. The benches are heated by twin-producers, as described by Mr. Lamson in his paper. These producers appeared to the writer to be fitted with the "Doherty bench-fuel economizer," though, while it looked remarkably like it, it may have been somebody else's design. But the heats were very good and even; and the furnaces no doubt contributed much to the economic operations of the whole. In other respects the benches did not differ in any notable degree from other horizontal throughs seen by the writer, unless it may be in the kind of material of which they are said to have been constructed. This is called "Ricon" in Mr. Lamson's description; and it is claimed to be a better conductor, and to have much greater resisting power to heat, than ordinary fire-clay. But while this is something new, it does not account for the yield of over 6 cubic feet of 17-candle power gas from (so it is said) the same kind of coal which formerly produced only 5 cubic feet of 15 to 16 candle power gas. That this coal is "Westmoreland," or, in name, the same as coal previously used, is not convincing.

In my experience of 36 years in the gas business, I have always known that Westmoreland gas coal was of the very best quality of gas coals on the market. I remember, however, once upon a time having used a certain coal which produced considerably over 6 cubic feet of more than 30-candle power gas per pound, and was, in fact, so rich that, for a period of twenty-four hours, I made 22·5-candle power water gas, using no oil in the operation, but only gas coke in the "Granger-Collins" water-gas generators, and the coal in ordinary free-firing old-fashioned retort-benches. To make the candle power of mixed gas mentioned, we used 43·6 per cent. of coal gas and 56·4 per cent. of blue water gas. This coal was supplied by the Log Mountain Coal Company, of Pineville (Ky.), which may now be no longer in existence. In appearance it could be mistaken for some of the best "Westmoreland" coal; and the coke from it was of good quality, as coke went in those days.

Other happenings of a somewhat similar nature could be given; but it requires no elaborate argument to convince gas men of experience that coal taken actually from the same mine will sometimes differ in quality to an astonishing degree. But that 6 cubic feet of a fair quality of gas may be produced from a pound of coal which yielded much less in ordinary working, is not to be denied. The Darius-Davison retort did this back in the early seventies. The gas and vapours produced were made to pass through a considerable distance of heated clay retort; and so the 6 cubic feet and more, from coal giving 4½ cubic feet, was demonstrated possible but not practicable. And, as the famous Battle Creek food reformer remarks in connection with something else, There's a reason. Some of us tried the 6-cubic-foot stunt, too, and soon were rewarded with pitch in everything—from the hydraulic main to the holder inlet, but especially in the purifier connections. Mr. Lamson, in his paper, illustrates some of the earlier experiments in coal-gas production, but has not mentioned Samuel Clegg's web retort, or his revolving disc retort, by each of which more than 6 cubic feet of a better quality of gas was said to have been obtained than by the same kind of coal carbonized in the now hoary with age, but still lively, horizontal retort system.

While on a trip to Worcester to view the new retort-house, the writer dropped in at Charlestown (Mass.), which works are under the able management of Mr. S. J. Fowler, and where quite remarkable results were being obtained, second only to those at the former city. The retorts were horizontal throughs, as at Worcester; but they were operated with a different kind of charging and discharging apparatus. Mr. Fowler demonstrated evidently what an able man could do to modernize a very old-fashioned retort-house at a reasonable cost. While admirably arranged, considering the old house in which the apparatus was placed, and, however creditable the whole must appear to all who have seen it, the Charlestown retort-house is outclassed by the splendid and smooth-working one at the other Massachusetts city, which, being entirely new, and having had unlimited capital at the back of it (to expend in construction), was to be expected to shine, as it does, above its more ancient and smoky sister works.

In all that the writer has observed, however, he can see no good reason to recall anything he may have previously said or written relating to the superiority of either the inclined or the newer vertical retort system; and the same will appeal to any person (gas engineer or not) who, by a personal inspection and investigation, and unbiassed by prior considerations and conditions, will compare them uninfluenced by the charming personality of a however much interested contractor. Mr. Lamson believes that he has done this; and no one can doubt or mistrust him. But even he, as previously mentioned in his own paper, remarks, in effect, that the last word has not yet been said on the subject—showing thereby his wisdom, for which he is celebrated. In the writer's opinion, the new Worcester horizontal retort-house is a model which cannot be easily improved upon for this class of setting.

But let us now make a few comparisons which shall be true, even if, as proverbial, odious—let us hope not to everybody. Taking several large retort-houses to produce any given, but in each case equal, quantity of gas, be it a horizontal installation of the Worcester type, or inclines of the type to be seen in operation at Lynn (Mass.), or verticals, now in course of erection at Providence (R.I.), all must have a capacious elevated coal-bunker, and all do, may, or can, employ machinery to convey the coke away from the benches to the storage-bins. Coal breakers, elevators, and such machinery will be employed in either of these plants, and, to handle a like amount of material, are likely to cost about the same in every instance—local advantages or otherwise excepted.

The fuel economizer system, as seen at Worcester, is not confined to horizontal settings, but is applicable to all; so that these advantages are common ones. But while an inclined-retort installation requires much less ground space than a horizontal one, the verticals need still less; and if the "Bolz" vertical system is adopted, the area of floor space is immensely reduced. While the inclined-retort system has all the advantages, if they be such, seen at the Worcester installation—viz., a small, free space above the charge of coals in the retorts—and unless the "Ricon" material does the business, should give as much and as good gas per pound of coal as obtained at Worcester, no expensive machinery is required to discharge or charge the retorts, excepting that which is common to all, as stated above. As these machines cost a whole lot of money, and are rather expensive to maintain and require some skill to handle, while with either the vertical or inclined systems no skill at all is necessary to properly load and unload the retorts, it would appeal to one that the inclined system is considerably to be preferred to the horizontal retort system.

Figures submitted by well-known and highly respected gas engineers have fully substantiated the claims made for the inclined, as well as the only a few years later, but rapidly (in Europe) appreciated, vertical retort systems. The absolute fact that experienced gas men who have operated various sorts of machine-stoked horizontal retort-benches discarded these for the inclines, and now have, and are adopting, the vertical retorts in place of all others, would seem to be convincing; but it evidently is not to some men, who no doubt have reasons of their own which satisfy them. But after careful consideration of all facts, the writer cannot see any reason to regret having written the words quoted almost at the beginning of Mr. Lamson's valuable paper, or to qualify or to retract one single word or sentiment contained therein.

Norfolk, Virginia, Oct. 26, 1909. FREDERIC EGNER.

German v. English Gas-Retorts.

We have received a letter from a firm of fire-brick makers in the North, growing out of the recent correspondence and comments in the "JOURNAL" on fire-clay and fire-brick material. Portions of the letter are not fitted for publication; and, of course, it would not be well to mention the names of the places and engineers indicated below by blanks. They are, however, given in the letter we have received.

Our correspondents write as follows: Five years ago we erected a large works at . . . to develop the . . . seam of clay; and though we have repeatedly tried to get Mr. . . . [a gas engineer in the near neighbourhood] to try the quality of our productions, we have not yet been successful.

The same thing applies to the corporation of . . . [also a neighbouring works]. We, after four years effort, got an order for four tons of bricks, which were condemned as quite unfit for gas-works purposes, and which condemnation is qualified by the fact that we had previously been graciously allowed to submit samples—six bricks or so at a time. These were invariably condemned; so invariably, in fact, that we doubted the fairness of the alleged trials, and procured some . . . bricks—the brand known to be used at the works in question. Having manipulated the brand, we sent these in to Mr. . . . [the engineer of the works] for test—only to find, as we expected, that they were no better than the many previous samples. All this time, the same . . . branded bricks were being held up to us as patterns of what fire-bricks ought to be; and lo! when the same bricks, *minus* the magic brand, are submitted by us, they are found to be useless. We, of course, wrote Mr. . . . explaining what we had done, and hoped that he would then have taken the subject up and thrashed it out. But, no; he pretended to be indignant that we had deceived him, and made that the excuse for keeping us outsiders. And yet we hear about the lack of enterprise, intelligence, and skill of British fire-clay manufacturers.

During the five years since we started our . . . works, we have trebled them. We can now produce 60,000 fire and silica bricks per day; while extensions in progress will bring this up to 100,000 per day. We have a large up-to-date retort plant under construction; but have no hope of orders from any but the smaller gas-works.

Mr. . . . [a contractor for gas apparatus in a large way of business] called on us recently; and, after seeing through our works at . . . he remarked that he had seen the best fire-brick works in America and on the Continent, and that we could beat anything

anywhere—Stettin included, which till that day he would have said was the best.

It is only fair to Mr. Carpenter, who raised the question of "German v. British Retorts," to say that he was good enough to order about 40,000 of our . . . brand of bricks this summer; and we cannot therefore complain that we have been boycotted there.

Our bricks built into the . . . gas-works four years ago, are still in use; and there are many small works where they are giving the utmost satisfaction—not to speak of the millions used by certain contractors named for gas-works all over the world.

It is twenty-two years since we began to make fire-bricks at . . . and the only orders we ever remember getting from the . . . gas-works [the principal ones in the neighbourhood] were for some Ganister bricks through one of our competitors, who could not make them at his own works. After supplying these for several years, we ventured (foolishly enough) to mention to the then officials at . . . that they were really using our bricks though coming through their other friend. This was fatal; and the inquiries from their friend ceased. This incident was before the time of Mr. . . . [the present engineer]; but the "permanent officials" are still there.

PARLIAMENTARY INTELLIGENCE.

THE PROPOSED NEW STANDARD BURNER.

Notices for Joint Bills next Session.

As the outcome of the recent action of the Gas Companies' Protection Association with the view of obtaining parliamentary sanction for the general adoption of the "Metropolitan" No. 2 burner for testing gas, certain Gas Companies decided to promote a Joint Bill for the purpose. In view, however, of the number of Companies concerned, the authorities of the House asked, as explained in our editorial columns to-day, that three Bills should be promoted, and that one of them should have attached to it the names of ten of the Companies. These were accordingly formed into the following groups, and last week the necessary statutory notices were given for three Bills, with the names as grouped appearing in a schedule in each case.

Bill No. 1.—Brentford, Croydon, Hastings and St. Leonards, Ilford, Liverpool, Maidenhead, Scarborough, Swansea, Torquay, and Wandsworth and Putney.

Bill No. 2.—Berkhampstead, Bournemouth, British, Cambridge, Chigwell and Loughton, Faversham, Harrow and Stanmore, Hatfield, Hemel Hempstead, Herne Bay, Newmarket, Ormskirk, Prescot, Radcliffe and Pilkington, Reading, Shrewsbury, Tunbridge Wells, Waltham Abbey and Cheshunt, West Kent, and Worthing.

Bill No. 3.—Aberdare and Aberaman, Bath, Exeter, Gloucester, Godalming, Guildford, Hampton Court, Ipswich, Mid-Kent, Newport (Mon.), Plymouth and Stonehouse, Richmond, Romford, Southampton, Walton-on-Thames and Weybridge, Weston-super-Mare, and Wolverhampton.

The objects of the Bill, the title of which is the "Gas Companies Standard Burner) Bill," are as follows:—

To make provision for the adoption of the "Metropolitan" argand burner No. 2, or any other burner which the Board of Trade may approve under the provisions of the intended Act, as a standard burner, in substitution for the various burners now in use for the official testing of the illuminating power of gas supplied by the several Companies whose titles are set forth in the first column of the schedule hereinafter appearing.

To define the conditions and method of testing with the said standard burner, and the regulations to be observed in order to correct the volume of the gas consumed therein to the standard atmospheric pressure and temperature.

To amend, so far as may be necessary in connection with the purposes aforesaid, all or any Acts or Orders relating to the said Companies, and in particular the Acts or Orders severally set forth in the schedule.

Fatal Accident at Sydenham.—At an inquest at Lewisham on the body of James C. Mason (aged 53), a daughter stated that her father was employed as a fireman by the South Suburban Gas Company. Last month, he told her that he had slipped and fallen on his knee while wheeling a barrow at the gas-works. He was compelled to keep his bed and was attended by a doctor; but as he got worse, he was removed to the infirmary. Mr. S. Y. Shoubridge, the Engineer, said he saw Mason in the infirmary; and he then said that as he was about to wheel away a barrow of ashes, he slipped on his shovel and struck his knee and elbow. He was on night shift at the time; and though his knee was rather stiff he worked next night. He came the third night; but the foreman thought he ought to have a rest, and sent him home. Dr. Wheeler O'Brien, the accident fund doctor in connection with the works, attended him for some time, and then advised him to enter the infirmary. Dr. F. S. Toogood, Medical Superintendent of the Infirmary, said that on admission Mason was suffering from acute inflammation of the right knee-joint, and a wound on the front of the limb. There was also a large abscess under the left arm-pit, and another on the right elbow. He subsequently died from exhaustion following blood poisoning from the injury to the knee. A verdict of "Accidental death" was returned. Mr. Shoubridge said the Directors of the Company desired to express sympathy with the relatives. By this unfortunate occurrence, they had lost an excellent servant.

LEGAL INTELLIGENCE.

CLAIM BY A FORMER GREENOCK GAS MANAGER.

COURT OF SESSION—OUTER HOUSE.

Tuesday, Nov. 16.

(*Before* LORD MACKENZIE.)

The hearing of evidence in the action by Mr. William Ewing, formerly Gas Manager to the Corporation of Greenock, now residing at Ardshiel, Stepps, near Glasgow, against the Greenock Corporation was begun to-day. Pursuer sues for £1645 8s. as due to him for services rendered to the Corporation outwith his duties as Gas Manager. The defenders say that the works charged for were included within the duties of the pursuer's office, and were covered by the salary paid to him; and that the claim is barred by delay.

The pursuer was represented by Mr. WATT, K.C., and Mr. J. B. YOUNG (instructed by Messrs. Gardner and Macfie, S.S.C.). Mr. M'LENNAN, K.C., and Mr. MACMILLAN (instructed by Messrs. Cumming and Duff, S.S.C.) appeared for the defenders.

Mr. *James Donaldson*, the Manager of the Tonbridge Gas-Works, said that when he applied for the situation he now occupied he considered it was for the post of Manager simply, and not that of Gas Engineer, although he possessed the qualifications of a gas engineer. The duties of a gas manager were the general supervision of the manufacture, purification, and distribution of gas, the public lighting, advising the directors as to the purchase of coal and the sales of residuals, and ordinary repairs to the works. The duties of a gas engineer were to prepare plans and specifications for extra plant or reconstruction, and the supervision of the erection of the plant. During the time he had been at Tonbridge, he had been instructed to prepare reports and to supervise the construction of new works. In every case he was paid for this extra work. The payment was a lump sum on the outlay. He had seen the advertisement upon which Mr. Ewing was appointed at Greenock. It was simply for a gas manager. If Mr. Ewing was asked to report upon, and to supervise, a scheme of reconstruction, this would be engineering and not managerial work. The remuneration of an engineer for such work varied. He had known it to be 5 per cent., and as much as 15 per cent.; but 5 per cent. was quite usual.

In cross-examination, witness said he himself had had remuneration from the Company he served, for extra work, at the rate of 5 per cent. He received £50 on one occasion, and £75 on another. These sums were not awarded as honoraria. He had no contract before the work was entered upon; but he knew that his Directors were honourable men. He could not say that he knew of any other instance of a gas manager being allowed by his own people a percentage upon the cost of works. If a manager had the use of the office staff, a very small reduction might be made. There were now a large number of gas managers throughout the country who possessed gas engineering qualifications, and who obtained fairly good remuneration in consequence. Such engineering qualifications were put forward by candidates for posts, and was a strong point in their favour. He himself put such a qualification forward. He had done such work in his former situation, and had always been voted a sum based approximately on the outlay. This was a common practice.

In re-examination, witness said that where a gas manager did not possess engineering qualifications, an outside engineer was employed. In such a case the gas manager had nothing to do with the preparation of plans and the like.

Mr. *G. W. Anderson*, of Westminster, next gave evidence. [Counsel agreed to accept Mr. Anderson as concurring with the previous witness as to the duties of a gas manager.] He held that the work which Mr. Ewing was called upon to do was engineering work. In the absence of agreement, he considered that any payment for extra services was subject to the goodwill of the employers. He thought the charge made by the pursuer was quite a fair one.

In cross-examination, witness said that gas managers were in the habit of doing engineering work of a minor nature for their employers. It made a great difference whether a man was appointed gas manager or engineer. A manager might not be qualified as an engineer.

Mr. *Ewing* (the pursuer) said he was carrying on business as a consulting engineer in St. Vincent Street, Glasgow. He was Gas Manager to the Corporation of Hamilton for eight years. His appointment was as Manager, and to look after extensions and alterations which were contemplated. He had no arrangement with the Corporation of Hamilton for payment for the alterations, because it was recognized as part of his duties. The Corporation were so satisfied with the work that they, unknown to, and unsolicited by, him, voted him an honorarium of £150 and increased his salary by £150. His salary in 1892 was £150; and when he went to Greenock, it was £225. The advertisement of the Greenock Corporation was for a Manager only. He applied for the position, and was appointed; the letter of the Town Clerk intimating his appointment stating that it was in terms of the advertisement. He entered upon his duties at Greenock on Nov. 15, 1901. Mr. Stewart had been Manager of the gas-works at Greenock. Before taking over his duties, pursuer saw Mr. Stewart, who told him that he had been retained as Consulting Engineer. He said to Mr. Stewart that he understood so, and that that was the reason why he had applied for the managership. Mr. Stewart told him that in previous years he had been paid for engineering work. He said that he had received £600, and that he anticipated payment for the work then in hand. In a minute of the Corporation, it was stated that the Gas Committee had before them the question of appointing Mr. Stewart as Gas Engineer or employing an outside engineer. Mr. Stewart told him he had resigned the position of Manager the previous March, and had been retained as Consulting Engineer, at a salary of £100 a year. Mr. Stewart told him that Mr. Chalmers was appointed Manager; but became ill, and was unable to take up the duties. Mr. Chalmers had been a collector, and had no experience of managing such work, and had no engineering qualification whatever. Mr. Stewart was, in consequence

of Mr. Chalmers' inability, in November, 1901, retained as Manager and Engineer, at a salary of £400, with £6 a month for a house. At the time he (pursuer) entered upon his duties, the retort-house was under extension, and new stoking machinery was being added. The general plans had been prepared by Mr. Stewart. The machines, being patented, were those of the Contractors. Mr. Stewart became ill, and the Convener—Bailie Campbell—instructed pursuer to generally supervise the erection of the machinery pending Mr. Stewart's recovery. He was called to a meeting of the Gas Committee which was held about the beginning of October, 1901, when the question of the extension of the gas-works was brought up. The matter was discussed as to whether he or an outsider should be appointed engineer. The Committee unanimously resolved that he should be appointed. Nothing was said at this meeting as to remuneration. About Dec. 1, 1901, he was asked to report on the best method of utilizing the works as they then were; and in September, 1902, he was asked to report on the installation of six purifiers. In February, 1903, he was instructed to report as to the scrubbing and purifying plant, and as to what he considered best to do, and to prepare plans and specifications. This report was presented in March; and he was instructed to have the purifiers reconstructed. In May, he was instructed with regard to offers for a proposed new scrubber and tar-extractor. In 1906, he was instructed to prepare plans for a new purifier-house. He received his instructions mostly verbally, but sometimes in writing from the Town Clerk. The preparation of such reports was the work of an engineer. He did these works after his managerial duties were complete. The preparation of the plans, for which he charged 2½ per cent. on the cost—the usual charge—was mostly his own work. A lad in the office (James Purves) traced some of the plans, and laid down some of the lines; he (Mr. Ewing) laid down the others. He signed the plans as Engineer. He supervised the whole of the work, and issued certificates to the Contractor as Engineer. This was the usual duty of an engineer. In 1901, there was stoking machinery in the works; but it was incomplete. The machinery was quite good; but the arrangement made it an absolute failure. In March, 1902, he was asked to attend meetings of the Gas Committee about the machinery. The results of the experiments by the Contractor were so unsatisfactory that the Contractor went back to England with a new contract in his pocket. He issued some certificates, but refused others in the interests of the department—the work, in his opinion, not being up to the guarantee. At the beginning of 1905, he said to the Town Clerk (Mr. M'Culloch) that it was about time he was rendering his account for fees. The Town Clerk said that, in view of the larger extensions about to be made, it was better to defer it to the end. The extensions had lasted from the time he took over the duties; and when he left they were not completed. He also mentioned the matter to Bailie Steele, who was Convener of the Gas Committee. Bailie Steele left him suddenly that day, and made no reply. After speaking to the Town Clerk, he spoke to Treasurer Brown, and told him that the Town Clerk had advised him to delay rendering his account until the extensions were completed. Treasurer Brown did not give a reply, but shook his head, as if he assented. He seemed to agree with the statement. In 1908, disagreement arose between him and the Corporation. So far as he was aware, this was absolutely due to the stoking machinery, which he took the initiative in pointing out was defective and hindering good work being done. Ultimately, on Sept. 9, 1908, he resigned his office. In his letter of resignation, he reserved his claims for remuneration; and he did the same in his receipt to the Corporation. His claim was for fees for engineering work done. He did not think it necessary to make any arrangement with the Corporation—a professional fee ran without arrangement. So far as he knew, all gas managers who acted as consulting engineers were paid. There never was any intimation to him that he would not be paid. It was true that he employed the staff to assist him in the preparation of the plans; but he had allowed for that—to the extent of £13 10s. In all the plans and specifications he was described as Engineer, and not as Manager. On Oct. 2, 1908, defenders advertised for a Gas Manager, whose duties were to include all work in connection with the works and plant, or engineering details with which he might be entrusted. It was an engineer-manager they advertised for.

In cross-examination, pursuer said the conditions of his appointment at Greenock included sole charge of all repairs and extensions; but he did not remember whether the details of the conditions were communicated to him. He did not remember a single instance of a gas manager taking charge of repairs and extensions. He knew of more than one instance of a gas manager receiving a percentage from his own employers upon the cost of extension work which he supervised. Before he sent in his application for the Greenock post, he knew from the Technical Press that Mr. Stewart was ill; and this was the reason why he applied for the position of Manager. In his application, he stated that he had served an apprenticeship to gas engineering. This was in the Hamilton Gas-Works. He also stated that his experience qualified him for the carrying-on of all the departments of gas engineering and management. This was written because of the possibility that Mr. Stewart would some day retire as Engineer, and that pursuer might succeed him. He knew that at the time it was proposed to appoint Mr. Stewart as Consulting Engineer, at a salary of £100, there was a Manager with a salary of £300. The salary he (pursuer) got was £400 a year. Mr. Stewart did not retire from the post of Engineer when he (Mr. Ewing) went to Greenock. Mr. Stewart signed one or more certificates after he went. He could not say when he put "Engineer's Office" on the door of the office, or when he bought a rubber stamp with the same words. It must have been after he was appointed interim Manager. He was appointed Engineer at the meeting of the Gas Committee in October, 1901. If there was no reference in the minute to his appointment, he did not take the minute.

Lord MACKENZIE: The whole thing had been conducted in a most hopelessly unbusiness-like way, on both sides.

Asked if it was not an invariable practice that no charge was made for preliminary plans and reports when a percentage was got on the work ultimately done, pursuer replied in the affirmative. When, however, it was held over for a year, and other plans were made out, both were charged for. The whole of the plans here were made on the instructions of the Committee, and were his own design. The draughtsmanship was the work of the draughtsman in the office.

Wednesday, Nov. 17.

On the resumption of the proceedings to-day,

Mr. *Ewing*, in further cross-examination, said he spoke to the Convener of the Committee about the advantage there would be in having a high-pressure main, and the Convener asked him to report on the subject. He prepared a report and submitted it; but the Committee held it over. He did not frequently and voluntarily, and without instructions, put forward recommendations. Probably there was one exception. He did not say to his Assistant (Mr. Purves) that he was entitled to dictate to the Gas Committee what schemes they should undertake. Mr. Purves did not superintend the erection of the works after he came. Mr. Purves was a distinguished student—after he came to him. He took the silver medal of the City and Guilds of London Technical Institute; but he had absolutely no experience before he went to Greenock. Taking the medal did not involve a knowledge of gas engineering. Mr. Purves was still in the service of the Greenock Corporation. Pursuer did not resign to avoid dismissal. He resigned of his own free will. In October, 1904, he received notice of a resolution by the Gas Committee, which included statements to the effect that the friction between him and the Committee must cease, and that after November his engagement should be during the pleasure of the Corporation, and should be terminable at one month's notice. There had been friction with regard to the stoking machinery. In that matter he was proved to be absolutely correct. The stoking machinery did good work, so far as wages were concerned. The two months' notice was withdrawn in 1906. There were complaints by two gentlemen about his frequent absences in Glasgow. In 1902, Messrs. Blake, Barclay, and Co. and himself were asked to submit designs for a scheme to make the best of the retort-house. But Mr. West said he would have nobody to compete with him, and he got the contract; and their designs for the machinery and retorts were never submitted. Messrs. West obtained the contract. He (pursuer) was instructed to proceed with the erection of the works and to supervise their completion. The instruction might be in the minutes, or it might have been verbal. He supervised the work to the finish, and issued and signed certificates to the Contractors. The total cost of £14,764 was taken from the accounts. It was he, and not Mr. Dewar, who, when the Contractors applied for part payment, examined the work to see how much had been completed. He was in the habit of receiving every year from the Town Clerk an official pocket book containing the standing orders of the Corporation, and with the words on the outside "W. Ewing, Gas Manager, Greenock." He made up an annual estimate of revenue and expenditure. He did not include in them any proportion of his engineering charges, because the Town Clerk had advised him to wait till the works were completed.

Re-examined: Mr. Stewart informed him that Mr. Chalmers had been appointed Manager at a salary of £300 a year, and that he (Mr. Stewart) had been appointed Consulting Engineer, at a salary of £100 a year, and that the Gas Committee had recommended that he be granted a retiring allowance of £150 a year. The recommendation was never submitted to the Council. He understood that Mr. Stewart was paid as Consulting Engineer down to February, 1901. After he set aside the machinery in the retort-house, he showed results which had never been equalled since. These results had enabled the price of gas to be reduced by 8d. per 1000 cubic feet. The work he did was an extension of the capacity of the works. It was a more difficult task to extend old works than to erect entirely new works.

Mr. *Robert Grierson*, Joint Town Clerk of Dumfries, was, for convenience, at this stage called for the defence. Witness said there were two Managers at the Dumfries Gas-Works. They were called Managers. Their predecessor—Mr. G. Malam—was designated Manager. During Mr. Malam's tenure of office, the gas-works were largely reconstructed. He never received any remuneration for this work. No trace could be found in the minutes of an outside engineer having been employed.

It having been pointed out, in cross-examination, that in the "Gas World Year Book" Mr. Malam was described as an "Engineer and Manager," witness said there was no trace in the minutes of any appointment of an Engineer. He did, however, work both as Engineer and Manager. So far as he knew, no claim was ever made by Mr. Malam in respect of engineering work. The largest extension at Dumfries during Mr. Malam's office cost £8000.

Resuming the pursuer's case,

Mr. *Robert Philip*, the Managing-Director of the Royal Hotel at Bridge of Allan, said he was Provost of the burgh from 1896 to 1906. He was also a Director of the Bridge of Allan Gas Company. About 1904, it was decided to erect new gas-works. The late Mr. Scott had been Manager for a great many years. He offered to undertake the engineering work. It was agreed that he should do the work, and should be paid £300 for it. Mr. Scott supervised the erection of the works. He thought the outlay on the new works was about £12,000.

Lord MACKENZIE. That is just 2½ per cent.

Mr. *Thomas Wilson*, the Manager of the Coatbridge Gas Company for about thirty years, said that, in addition to being Manager at Coatbridge, he was Consulting Engineer to a number of gas undertakings. The duties of a manager and an engineer were quite different. A manager had to take charge of the manufacture and distribution of gas; and an engineer had to prepare the plans for works. Repairs would fall under a manager's duties. From the terms of the advertisement when Mr. Ewing was appointed, he should expect that he was appointed to perform manager's duties solely. His experience was that managers did not prepare plans and issue certificates unless they were appointed engineer and manager. If Mr. Ewing prepared plans and specifications, and supervised the work and granted certificates, he was entitled to an engineer's fee. When he (Mr. Wilson) prepared plans and supervised the work, he was paid 5 per cent. If he prepared plans only, he charged 2½ per cent.; the other 2½ per cent. went to supervision. A man on the spot might do the work for less.

Cross-examined: The minute of his appointment was "Mr. Wilson, Gas Engineer, Saltcoats, has been unanimously appointed our Manager." He had carried through two extensions of works—one of £11,000 and the other of £26,000. He had done all the engineering work in these extensions. He was paid for this. He made no charge. He was on very friendly terms with his Directors; and they treated him in a

gentlemanly manner. They paid him honoraria for the engineering work. He thought the Company were morally bound to give him something. He made no arrangement with the Directors; he considered he was quite safe in their hands. The question of employing an outside engineer never came up at all. When he was employed by an outside body, he prepared all the plans himself. He supposed the Coatbridge Gas Company furnished the materials. It was a very small matter. If it were only a report which was wanted, he thought it was a manager's duty to prepare that. If plans were prepared, that was a different matter. Mr. Ewing would not have begun to prepare plans and specifications without the special instructions of his Corporation. If a man were described as engineer and manager, he had both duties to perform. If he were manager, he had only a manager's duties. He himself never called himself gas engineer, but only manager. He thought manager was a much nicer name than engineer. It was quite common for a gas manager to call himself engineer and manager. It did not depend upon names whether Mr. Ewing was to be paid for the work; his Committee were bound to give him something. Ordinary repairs in a retort-house were a manager's duty. Within the last twelve or fifteen years, open firing had given place to gaseous firing; and retort-benches had had to be altered in consequence. This was engineering work. Mr. Ewing's hand was tied; he never could get his improvements carried through.

Mr. *Alex. Yuill*, the Engineer and Manager of the Dundee Gas-Works, said he had had experience in connection with gas undertakings for thirty years. He had seen the advertisement upon which Mr. Ewing was appointed. The duties of a man appointed under the advertisement would be the duties of a manager, which were entirely different from those of a gas engineer. A manager's duty was to superintend the operations, both of the manufacturing and distributing of the gas, together with all the repairs required from time to time. A gas engineer's duties consisted principally in dealing with structural work—the preparation of plans and specifications, and superintendence of the work. The work he knew Mr. Ewing to be doing at Greenock was that of a gas engineer. Asked if it was reasonable of the Corporation to expect him to report on work of the kind, and of such an extent, without remuneration, witness said they could only do so from a consciousness of his capabilities as such. Remuneration was a different point. The preparation of plans and specifications was engineers' work. The Corporation asking Mr. Ewing to do the work was tantamount to their considering him their Engineer. The plans prepared by Mr. Ewing required engineering skill, such as they would not, as a rule, find in an ordinary gas manager. He himself prepared all his plans according to his own designs, and without any aid from contractors. Of course, contractors were not selected till after plans and specifications were prepared and offers received. In the case of special patents, no specification was required beyond the name of the patent. He had acted as Gas Engineer at Carluke, Inverurie, Huntley, and Motherwell. At all these places there were Gas Managers.

Cross-examined: His appointment was as Engineer and Manager. He received an honorarium of 100 guineas on the completion of the carburetted water-gas plant contract. He did not see how it was possible for any man to designate himself engineer and manager if he had not the qualifications to act as such. A man appointed as manager would not be entitled to object to report upon the existing state of the works, if he were qualified to do so. It did not require engineering skill to advise on extra purifier or gasholder accommodation. Asked whether, supposing Messrs. West were carrying out a contract in the gas-works, Mr. Ewing would be entitled to charge for the supervision of the work by Messrs. West, witness said that would depend upon his position. It was a very uncommon occurrence for any company to place the whole engineering work, or new work which might be required, in the hands of a contractor. Counsel put it that Messrs. West were practically Consulting Gas Engineers themselves; but witness said he could never reconcile the position of a consulting and a contracting gas engineer as one. Asked whether, if pursuer occupied the position of Manager and supervised the work of Messrs. West, he would be entitled to charge 5 per cent. on the contract price, witness said he did not think he would. Counsel then asked witness if, in his opinion, it was a matter of degree whether a particular repair or renewal ceased to be a proper work for a manager and called for the intervention of an engineer. Witness said that, to his mind, the position was well defined. No outside engineer had been called in at Dundee since he went there. His predecessor was described as Engineer and Manager.

Thursday, Nov. 18.

Mr. *John Sharp*, formerly with Messrs. R. Laidlaw and Son, of Glasgow, said it was not usual for a manager to be asked to carry out large schemes of extensions. Where the manager was not possessed of engineering skill, it was necessary that an outside engineer should be called in to do such work. He had examined the plans and specifications produced; and they seemed to be the work of a skilled engineer. The draughtsmanship was one thing, and the engineering was another. These were quite reasonable for the purpose in view.

Cross-examined: He had known gas managers to do engineering work; but they were acting in the capacity of a gas engineer. He was not aware of any case where a man holding an appointment as gas manager, who had no engineering skill, carried out large extensions to works. If they did anything more than might be included in the work of a gas manager, that must be considered as the work of an engineer. He could not say he knew of any case where a claim by a gas manager upon his employers for commission on the cost of erection had been admitted; but he knew that it was not unusual for a man holding a permanent appointment as gas engineer and manager to receive recognition for special services, either by honorarium or increase of salary. He considered that skill was required in the selection of patented, or specially constructed or designed, machinery—to select the kind of machinery which would be suitable for the circumstances and the space. Where machinery was specially designed, there was no need for elaborate plans and specifications; and a gas manager who was capable of doing this was entitled to consider himself an engineer.

Re-examined: The fact of the pursuer mentioning his qualifications as an engineer did not imply that he was willing to place such qualifications at the disposal of his employers.

Mr. *George Keillor*, Manager of the Broughty Ferry Gas-Works for the past six years, said he was engaged as Engineer and Manager. He considered that under his appointment he was bound to carry out any extensions that were proposed. Since he went to Broughty Ferry, he had performed the usual reconstruction of works, at a total cost of £2500.

Mr. *Ewing*, recalled, made a correction in his evidence, to the effect that the report of January, 1902, meant a cost of £45,117, not £4517. The £4517 referred to a report for utilizing existing machinery.

Lord MACKENZIE: Is that report in process?

Mr. *Ewing*: No.

Lord MACKENZIE: There are no report, no plans, and no estimates applicable to this figure of £4517.

This closed the case for the pursuer.

The Defence.

Mr. *John Hunter Campbell* said he was elected a member of the Town Council of Greenock in 1895, and served on the Gas Committee till he retired from the Council in 1902. He was appointed Convener of the Committee in 1896. Mr. Stewart was Manager when he joined the Council. Mr. Stewart resigned in July, 1900; and the pursuer was appointed the same year. When they appointed him, they had regard to his engineering experience, as detailed in his application for the post. The appointment was that of Gas Manager and not an Engineer. There was work in progress when the pursuer was appointed. Mr. Stewart had no special appointment in respect of the supervision of this work; he was doing it as Manager. Mr. Stewart was kept on for two months after Mr. Ewing's appointment; but after that time he received no further remuneration from the Corporation. When Mr. Ewing was appointed, he just stepped into the shoes of Mr. Stewart with regard to the work then in progress, and continued the supervision of the work as General Manager. Mr. Ewing made no protest with regard to undertaking the work. He accepted the instructions to go on with the work in the ordinary course. The suggestion had been made that it was in consequence of Mr. Stewart's illness that the pursuer was called upon to act as Consulting Engineer; but they understood that this was included in his ordinary duties. Throughout the period when he was Convener, the instructions given to the pursuer were given to him as Gas Manager. There was never, at any time, a discussion implying that the pursuer was Consulting Engineer. In his opinion, and in the opinion of the Gas Committee, there was no necessity, at any time, for calling in the services of an outside consulting engineer. They considered that the pursuer, with the qualifications with which he had come to them, was competent to undertake the work. The question of employing an expert never came up at all. So far as instructions were given to the pursuer, there was no differentiation; they were all given to him as Manager. He never heard from the pursuer that he regarded himself as entitled to extra remuneration, over and above his salary, for anything he had done at any time. He first heard of the claim after the pursuer's resignation. The pursuer met him casually in the street, and said to him he would have a large claim for work which he considered outwith the scope of his duties. He was not surprised at what the pursuer said, as he seemed to have a feeling that he was aggrieved, and that he would try to get the most that he could out of the Corporation. The pursuer seemed to feel that they had caused him indignity, and that he would make them pay for it. He spoke in a resentful spirit. The pursuer never included in his yearly estimates any sum for remuneration to himself for extra work. The result of the present claim, if admitted, would be to put a burden on the present ratepayers of charges which should properly have been rendered to consumers of previous years. There was no such discussion in Committee as the pursuer said there was, as to whether an outside engineer or pursuer should be employed to prepare the plans and specifications for extensions and alterations. His recollection of what transpired at the time was that there had been considerable criticism and complaint as to the quality of the gas; and the Manager was asked to state what, in his opinion, was necessary to put the works in such a condition as would enable him to produce better gas and better financial results. In doing so, they considered that they were employing him, not in the capacity of a consulting engineer, but in his capacity as Manager. There was no idea of preparing plans and specifications. In the report which the pursuer presented, he proposed a most elaborate scheme of work, costing £45,117. They did not take the report seriously, because they had not asked for, nor expected, a report of such a character. It entirely emanated from the Manager himself. What they wanted was to obtain a general idea of what was best to be done in the circumstances. The pursuer did not demur to the preparing of the report, nor suggest any remuneration for furnishing it. West's second contract was in connection with the installation of supplementary stoking machinery, and for the supervision of this work, as well as of the installation of hot-coke conveyors. He thought all that was necessary was a clerk of works.

Cross-examined: He did not recall that on Feb. 12, 1901, there was a letter from Mr. Stewart, in which he desired to resign his position as Consulting Engineer. He did not remember that the Corporation considered the necessity for borrowing £100,000. Their borrowing powers were exhausted, and they required renewed powers. There was a discussion in the Committee as to whether they should advertise for a Gas Manager or a Gas Engineer and Acting Manager; and it was decided to advertise for a Gas Manager simply. When this discussion took place, there was no reference made to the alterations and extensions in contemplation; and he did not think that the extensions and alterations bore to any extent upon the question of whether they should advertise for a Gas Manager or for an Engineer and Manager. The alterations had not been decided upon; and it did not seem necessary to advertise that they were in contemplation. He did not believe there was a discussion as to whether they would appoint an outside engineer or Mr. Ewing. It would have been necessary to put that into the minutes, if it had taken place. There would probably have been a division on the matter; but even if they had been unanimous, it would have been entered in the minutes. At the discussion on Oct. 11, 1901, the increasing demand for gas did not enter into it—it was the quality of the gas and the complaints which were discussed. The pursuer exceeded his instructions in this respect, that he suggested the erection of

new works. They did not want anything like such an elaborate scheme. He could not say that they told the pursuer so. It did not appear in the minutes that the Committee took the view that the pursuer had gone outside his instructions.

Mr. *John Morison*, Accountant, of Greenock, said that he joined the Corporation in 1899. He became Convener of the Gas Committee inSeptember, 1902, and left the Corporation in November, 1903. In October, 1901, a meeting of the Committee was held. There had been a deficiency in the previous accounts, and the management—he did not say the Gas Manager—was being criticized. The Committee asked Mr. Ewing his explanation; and he gave the condition of the works as his reason. There was no foundation for the statement that the Committee discussed whether they would employ the pursuer as Gas Engineer. The preparation of plans and specifications was not in contemplation at the time. They did not employ the pursuer for the work; they asked him to tell them what was necessary to get over his complaint as to the condition of the works. They were not in a financial position then to face anything like the expenditure suggested. In December, 1901, the stoppage of the stoking machinery was referred to at a meeting of the Corporation; and the Manager was instructed to report as to the best method of utilizing the works as they stood. He submitted a report which would have involved an outlay of £45,000. In his judgment, the report went far beyond anything they had any practical intention, or the means, of carrying out at the time. The pursuer was not, in connection with any of his reports, ordered to prepare plans and specifications. He never heard of the pursuer being appointed Consulting Engineer, or that he expected remuneration for extra work. The reports were asked from him as Manager. In 1902, he directed the pursuer's attention to the requirements of the Act of Parliament as to the preparation of the annual accounts, and told him that everything must be put in. The pursuer made no reference to any claim by himself for extra remuneration.

Cross-examined: When Mr. Ewing was appointed, a minority of the Committee, of which he was one, thought the man to be advertised for should be one possessing engineering qualifications. Mr. Ewing led them to understand that he had done this sort of work at Hamilton, and that he was prepared to do it at Greenock.

Mr. *P. M. Kirkpatrick*, the Town Clerk of Hamilton, produced documents relating to the appointment of Mr. Ewing as Gas Manager at Hamilton. The Gas Committee recommended, in terms of a minute adopted in June, 1892. This minute did not make any condition as to engineering work. The office to which Mr. Ewing was appointed was described as "the managership of the gas-works." After he went to Hamilton, the gas-works were practically reconstructed, at a cost of about £18,000. The engineering work in this remodelling was carried out by Mr. Ewing. In 1895, Mr. Ewing submitted a block plan of what he proposed. The Corporation considered that the opinion of a gas expert should be obtained; and Mr. W. Key, of Glasgow, was consulted. Mr. Key recommended on the same lines as Mr. Ewing. Mr. Ewing was instructed to have the work done; and he supervised it. The scheme of reconstruction took origin in the Gas Committee being convinced that the gas-works were inadequate, and asking Mr. Ewing to report on the matter. Mr. Ewing did not suggest that he should be paid extra, either before or after the work was done. The work of reconstruction took about two years to execute. In January, 1897, after discussion as to whether Mr. Ewing's salary should be increased, or that he should be granted an honorarium, the latter was agreed upon, and a sum of £150 was voted. In his application for the post at Greenock, the pursuer described himself as Gas Engineer and Manager at Hamilton. The minute bore that he was appointed as Manager. He could not say how the £150 was entered in the burgh accounts; but it could quite reasonably have been entered as capital.

Mr. *A. Balfour Gray*, the Town Clerk of Falkirk, said that Mr. Wilson, who was in charge of the gas-works there, was designated "Manager." He was under agreement, which required him to design and take charge of extensions to the works.

Cross-examined: Mr. Wilson had to do everything the Town Council required of him in connection with the gas-works. He (Mr. Gray) was instructed to put in the word "Manager," and not "Engineer" into the agreement.

Mr. *John L. Jack*, the Town Clerk of Wishaw, said that Mr. Peter B. Watson, who was in charge of their gas-works, was designated "Manager." He was under agreement to give his whole time and attention to "his duties as Engineer and Manager." He considered that Mr. Watson was bound to carry out any work which might be required in connection with extensions.

Mr. *John Richardson*, Town Clerk of Musselburgh and Secretary to the Musselburgh Gas Company, said the man in charge of the gas-works there was designated "Manager of the Gas Company." Since he was appointed, they had practically got new gas-works. The cost was about £8000. An outside engineer was not called in. All the work was done by the Manager.

Mr. *John M'Onie*, Engineer, of Port Glasgow, said he was a member of the Town Council of Greenock from 1883 to 1893, and from 1902 to 1908. He was Convener of the Gas Committee when Mr. Stewart was Manager, and a year or two of Mr. Ewing's time. He never heard from Mr. Ewing of any claim he had in respect of extra work; and he never heard the subject mooted or discussed. He never understood that Mr. Ewing held a separate appointment as Consulting Engineer in gas matters, and he never recognized him as such. All the work he did was as Manager. He never knew of Mr. Ewing putting into his annual estimates any sum in respect of extra work.

Cross-examined: He was not aware that it was discussed in the Gas Committee whether they should advertise for a Manager or an Engineer. It would depend on the bargain whether, if a man were appointed as Manager, they could employ him to design and supervise the erection of works. Asked if, in his opinion, there was no difference between a gas manager and a gas engineer, witness said he thought that the one included the other.

Mr. *John Forbes* said he had been a member of the Corporation and of the Gas Committee since 1900. He was Convener till last week. When he was elected to the Town Council, Mr. Ewing had just been appointed. He did not understand that, in giving Mr. Ewing the instructions they did, the work was outwith his duties as General Manager. Mr. Ewing did not protest against getting the work to do; the suggestion as to the improvement of the works emanated from himself. When they gave him the instructions in 1901, they never considered that they were appointing him Engineer. All the works Mr. Ewing recommended were not carried out. The work was not completed yet. They were erecting new sulphate plant.

Mr. *Thomas M'Murrich*, the Town Chamberlain of Greenock, found from the books that Mr. S. Stewart received several payments, amounting in all to £600, as extra remuneration in connection with the inauguration of the new gas-works at Inchgreen. After this, between 1874 and 1900, he received nothing except his salary. The pursuer, in making up his annual estimates, never entered any claim for extra remuneration.

Friday, Nov. 19.

Mr. *Colin M'Culloch*, Solicitor and Town Clerk of Greenock since 1878, said that Mr. Stewart took charge of the erection of the new gas-works at Inchgreen, which cost £50,000; and he was voted £100 for his services. He got no further payments. After the works were built, there were other extensions, such as the erection of sulphate plant, oil-gas plant, and a new retort-bench, costing about £2000. Mr. Stewart prepared the plans and estimates for all these, and supervised the work. On Feb. 12, 1900, Mr. Stewart resigned his post. A Committee was appointed to consult him with reference to his resignation. The resignation was accepted, and Mr. John Chalmers, who was clerk and collector in the office of the Gas Department, was appointed Manager at a salary of £300 a year. The question of a retiring allowance to Mr. Stewart was considered; and it was agreed to recommend that Mr. Stewart be retained as Consulting Engineer during the work of extension which was in progress. Mr. Chalmers was taken ill, and died in July, 1900. On account of his illness, Mr. Stewart had been requested to continue as Manager; and the question of a retiring allowance to him was held over. Mr. Stewart intimated his willingness to continue to act until the extensions and alterations were concluded. These consisted of the contract with Messrs. West. It was resolved to advertise for a Manager at a salary of £300 a year, with free house. Mr. Stewart had made it a condition of his continuing to act that the Corporation should at once fix the amount they were prepared to pay him as a retiring allowance. The Police Board were not prepared to do this, but resolved that the question of a retiring allowance should be deferred, and that an immediate appointment should be made. Advertisements were accordingly placed; and on Oct. 11 pursuer was appointed by the Town Council at a special meeting. He intimated the appointment to the pursuer personally, by the letter produced. Pursuer wrote that he was prepared to take up the duties of Gas Manager on Nov. 15. He had a copy of all the minutes of the Corporation. He usually took his instructions through the printed minutes. He was invariably designated the Gas Manager. It was agreed to continue Mr. Stewart's full salary till the end of November. At the end of that month Mr. Ewing was introduced to the Gas Committee as the new Gas Manager. At the same meeting, it was resolved to continue Mr. Stewart till Dec. 31. This was to enable him to finish anything there might be remaining in connection with Messrs. West's contract. Mr. Stewart's services were continued till the end of February, after which no further payments were made to him. In October, 1902, a Sub-Committee considered an application by Mr. Stewart for a retiring allowance, and resolved that, in view of the large salary received by Mr. Stewart for many years, no allowance be granted to him. This resolution was confirmed by the Board. At the end of July, the attention of the Gas Committee was called by one of the members to a paper which Mr. Ewing had read, in which he dealt with the question of manual and machine labour, and showed that, in works similar in size to Greenock, machinery meant a loss of 12 per cent. It was resolved to adjourn discussion upon the subject until the Manager had lodged a reply to the statement made as to the management of the gas-works. In the Manager's reply, it was stated that Mr. West informed the Gas Committee that he alone would formulate a scheme for the working of the gas-works. This statement was not in accordance with his recollection. There was no such statement in the minutes. Several meetings were held in October, 1904; and these resulted in Mr. Ewing's engagement being made a monthly one. Considerable dissatisfaction with the pursuer was expressed. In Greenock, official appointments were made for a year. At each November a re-appointment was made, and the re-appointment was entered in the minutes, a copy of which was sent to the official, as well as a pocket-book containing the standing orders, with his name on the outside. In the case of pursuer, the name was "Wm. Ewing, Gas Manager." Mr. Ewing made a number of suggestions to the Committee which were too ambitious, and more than was necessary for the works, more especially seeing that there was at that time a large sum of money borrowed on account of the Electricity Department; and the two things would have added to the expenditure more than, as business men, they were prepared for. It was alleged at meetings that Mr. Ewing from time to time presented reports and schemes prepared by him without his having got antecedent instructions. In his opinion, these allegations were well founded to this extent, that Mr. Ewing brought in a large number of plans which were not requisite for the particular business in hand. He had not known of any claim by Mr. Ewing for extra remuneration prior to the letter he received from him, in which he stated that he reserved his claim. If Mr. Ewing had told him he had a claim, he must have brought it either before the Committee or the Convener. He gave no such advice as that the pursuer should keep over his claim for engineering fees until the completion of the existing contracts. No instructions were ever issued to the pursuer to act as Consulting Engineer; nor did he supervise the erection of the stoking machinery. He was, as Gas Manager, to take a general supervision over the machinery. The Gas Committee never considered the question of whether they would employ the pursuer as Engineer or have an outside engineer. In his opinion, the Committee did not instruct the pursuer to do all the work which was set forth in his report in October, 1901, but merely to report as to what he considered necessary to put the works into proper condition. In his opinion, the Committee did not contemplate such a report as pursuer submitted.

Cross-examined: When he received the pursuer's letter of resignation, he did not understand what was meant by the claim the pursuer

intimated, neither did the Gas Committee. In his opinion, to prepare and submit plans was scarcely a relevant answer to a proposal to do something to get better gas and increased pressure. The other details seemed to him to be beside the question. He could not say that Mr. Ewing was ever informed that any report of his was beyond the limits of his remit. The opening words of his reports were—"In accordance with your instructions, I beg to report as follows." Mr. Ewing proposed a large catalogue of improvements. Some of these had been carried out; but the majority had not.

Mr. *James M'Leod*, the Manager of the Greenock Gas-Works, said he was previously at Kirkintilloch. His appointment there was as Manager. When he went there, plans were prepared for the erection of new gas-works; and he supervised the erection of them. The cost, including the site, was £40,000. He received no extra remuneration for this work, and did not expect any, because in his application for the position he stated that he was qualified to look after the erection and renewal of works. His predecessor at Kirkintilloch received no extra remuneration. He was not aware that it was possible to distinguish so clearly as the pursuer had done between manager and engineer. A large number of gas managers possessed engineering qualifications; and they placed these qualifications at the disposal of their employers. He was not aware of any case in which a gas manager received extra remuneration from his employers for engineering work. He had known cases in which, after works were completed, the extra services of a manager were acknowledged in the shape of an honorarium. Since he went to Greenock, there had been new work, costing about £1500. The total cost of the new work done by Mr. Stewart after the transfer of the gas-works to Inchgreen would be, roughly, £15,000. The largest piece of work was a gasholder, costing £6000.

Cross-examined: When he applied for the post at Kirkintilloch, he mentioned his engineering qualifications. He had had an engineering training, and engineering experience for sixteen years. Before he went to Kirkintilloch, he was chemist in the Glasgow Gas-Works.

Mr. *William Monteith*, Assistant-Manager at Greenock, said that he was under Mr. Stewart for four years. During Mr. Ewing's tenure of office, he constantly came into contact with him. He never told him that he had received the appointment of Consulting Engineer, as distinct from that of Gas Manager. He told him when he sent in his resignation that he was going to claim for engineering work.

Mr. *George Thomson Purves*, Draughtsman and Assistant Manager at Greenock, said he was at Greenock under the pursuer for fully three years. He received his instructions from him as to the preparation of plans—sometimes rough sketches, and sometimes verbally. He did the work of supervision, subject to reporting constantly to the pursuer. It was not necessary to be constantly applying to the pursuer. He was not told by the pursuer that he was working for him, and not for the Corporation. If the pursuer had told him he was working for him, he would have expected to be remunerated. He understood that he was doing Corporation work. In a consulting engineer's office there would be a daily diary, containing notes of progress and the like; but there was nothing of this kind kept at Greenock, which would enable the pursuer to differentiate what he was going to charge separately for engineering work.

Mr. *Henry O'Connor*, of Edinburgh, said he was not aware that it was the custom to pay gas managers for extra work, though honoraria had been paid for such.

This closed the evidence; and the case was continued to Dec. 21 for the hearing of Counsel.

Receiver and Manager for the Rawcliffe Gas Company.

In the Chancery Division of the High Court of Justice last Friday, Mr. Justice Parker had before him a motion by a lady debenture holder in the Rawcliffe and District Gas and Coke Company, Limited, who sued on behalf of herself and all the others, for the appointment of a Receiver and Manager. Mr. Mackay, for the plaintiff, said the Company was incorporated in June, 1907, with a nominal capital of £10,000. In June, 1909, it was resolved to raise further capital by the issue of 200 debentures of £10 each. Only 42 were issued; and of these plaintiff held 12. A creditor for a small amount had obtained judgment in the County Court, and put in an execution. The money was therefore due under the conditions of the debenture deed. Mr. Willis, on behalf of the Company, said he was instructed to consent to the appointment of Mr. Davies, the Secretary of the Company, as Receiver and Manager. His Lordship accordingly appointed Mr. Davies Receiver as asked; but not to act as Manager for more than three months without further leave of the Court.

The Welsbach Trade Mark Case.—At the Clerkenwell Police Court, last Saturday, the hearing of this case was resumed by Mr. Bros. Evidence having been given by Dr. Oberlander and Mr. Duncan Watson, the case was again adjourned. These proceedings will be more fully reported next week.

Wolverhampton Gas Supply.—At a meeting of the Wolverhampton Trades Council, Mr. C. Smith raised the question of the municipalization of the gas supply, pointing out that in many towns a large profit was available from this source for the reduction of the rates. He said the fact that the town was growing, and that this was a monopoly, only put more money into the pockets of the shareholders. The municipalization of the gas would result in better light and a cheaper price. Though the rates in Wolverhampton were high, it was one of the worst lighted and dirtiest towns in the country. It was a disgrace that the gas-works should still be in the hands of a private Company. He understood that a number of members of the Town Council were interested in the Gas Company; and this would probably make for opposition. Mr. Hicken said they could only make progress in these directions if they had more Labour members on the Council. He hoped that next November they would be ready with candidates and money to pay their expenses. The Chairman (Mr. J. Whittaker) promised to bring the matter up in the Council.

MISCELLANEOUS NEWS.

INCOME-TAX AND DEPRECIATION.

Two Appeals.

In connection with the letter which appears in our "Correspondence" columns to-day, it may be interesting to record two gas companies' appeals which were heard recently.

An appeal on behalf of the Whitchurch and District (Hants) Gas Company, Limited, for an allowance in respect of depreciation for decreased value of plant and machinery by reason of wear and tear was heard by the District Commissioners sitting at Whitchurch, on Friday, the 12th inst. An assessment had been made allowing for depreciation; and this had been subsequently amended by withdrawing the allowance. Mr. W. A. Schultz, of No. 50, Cannon Street, E.C., appeared on behalf of the Company, and argued the case on the question of principle.

In view of the importance attaching to their decision, the Commissioners decided to adjourn the consideration of the question for a month.

A similar appeal on behalf of the Hungerford Gas Company, Limited, was heard before the Commissioners sitting at Newbury last Thursday. Mr. W. A. Schultz appeared for the Company. Figures had been formally agreed with the Surveyor in May last on which depreciation had been allowed; and this had also been withdrawn in October by an amended assessment.

The circular issued by the Inland Revenue authorities to the Surveyors was referred to by Mr. Schultz, who contended, on the authority of various Acts, that the Commissioners had no option but to allow depreciation; the question for them to decide being solely what was a fair and reasonable amount to allow, although in this instance no money had been expended during the year on renewals.

The Commissioners decided that depreciation should be allowed on the same basis as last year—viz., 3 per cent. on the written-down value of the plant and machinery.

The Surveyor, on behalf of the Crown, reserved his right to further appeal.

CONTINENTAL UNION GAS COMPANY, LIMITED.

Effect of the Messina Earthquake.

In the report to be submitted by the Directors of the Company at the ordinary general meeting on the 7th prox., they state that the most notable event of the year covered by it (ended the 30th of June) was the terrible earthquake which visited the South of Italy and Sicily on the 28th of December last, and reduced the city of Messina to ruins. The Board have to deplore the death of their esteemed Manager, Mr. F. Ruggeri, who perished with all his family, of the cashier, and of other members of the staff. Fortunately, comparatively few of the workmen were killed or injured, owing to the fact that the majority of them lived outside the city. The gas-works, though badly damaged, were not wholly destroyed; but the mains in the city suffered severely, and at the present time lie buried under mountains of *débris*. Scarcely twelve months have elapsed since this appalling disaster overtook Messina, and very little progress has been made with the rebuilding of the city, which is still little more than a heap of ruins. Under these circumstances, it is impossible for the Directors to arrive at any final decision respecting the future of the Company's enterprise there. In the meantime, stocks of coal, coke, and other residuals, together with a considerable quantity of meters, fittings, &c., have been recovered from the ruins, and have been disposed of. Moreover, the Company's obligations towards all their employees, whether in the form of gratuities or of pensions, have been provided for. As it is quite clear that, whatever decision may be arrived at ultimately with regard to the future, the loss sustained by the partial destruction of the works and mains must be very great, the Directors have decided to write off this year from the Messina outlay account a first instalment of £22,000, of which a sum of £10,000 has been taken from the reserve fund and £12,000 from the undivided profits. As regards the Messina town debt, the Directors have sent in a statement of claim to the Royal Commissioner, and have instructed their legal representative in Italy to press for payment with all possible vigour. They assure the proprietors that no efforts will be wanting to secure the payment in full of the amount due to the Company.

The Union des Gaz, in which the Company are so largely interested, has obtained during the year under review the concession for lighting Montigny-les-Corneilles, a commune adjoining Nanterre. The private consumers of the Union des Gaz have increased by 14,432, making a total of 258,381; and the public lamps have increased by 342. The total quantity of gas sold shows the very satisfactory increase of about 5 per cent. over the year 1907-8. Owing to the mildness of last winter, there was a falling off in the prices obtained for coke; but this was compensated for by the decrease in the cost of coal. The mains have been extended by 54 miles; making a total of 1181 miles.

The amount charged to capital account was £445,148, which includes the cost of new works and general offices at Milan, of new works at Genoa and Kehl, and of important extensions to the Nanterre and Strasbourg works. The Union des Gaz has made a further issue of debentures, in order to meet capital outlay due to the continued increase in the demand for gas in the various towns in which it has lighting contracts. After providing for debenture interest and redemption, the Union des Gaz has been able to maintain its dividend at the same rate as was paid last year, and carry forward £13,358 to the new account.

The net profit available for distribution by the Continental Union Company is £66,225, out of which the Directors recommend a dividend for the year of 7 per cent. on the preference stock, less income-tax, and 5 per cent. on the ordinary stock, free of income-tax; carrying forward £12,954 to the new account, against £11,126 last year.

ORIENTAL GAS COMPANY, LIMITED.

The Public Lighting Contract.

The Ordinary General Meeting of the Company was held last Wednesday, at the London Offices, Finsbury House, Blomfield Street—Mr. R. Hesketh Jones in the chair.

The Secretary (Mr. H. J. Luff) having read the notice convening the meeting, the report of the Directors and the statement of accounts were taken as read.

The Chairman, in moving the adoption of the Directors' report and the balance-sheet for the year ending June 30 last, said he had a few observations to make which need only be brief, as the report which had been before the proprietors for some days past succinctly gave the necessary information as to the present position of the Company. On this position he congratulated the proprietors; for, although it pointed out the necessity for large outlays in main-laying, and the steps which had been and would be taken to meet the requirements of the new public lighting contract, he might safely say that this expenditure must result in extending the Company's business, and add materially to its stability. As he pointed out at the meeting last year, the mains in Calcutta were laid in more than 300 miles of roads and streets, and covered an area of some 20 square miles; and until within the last three or four years, the delivery of gas at pressures sufficient for a supply during the day-time, or even between the hours of sunset and sunrise, had been embarrassed by leakage. The present Manager's attention and energies had been chiefly given to the improvement and development of the manufacture of gas at the works at Sealdah, which improvements had been successful; and he was to be congratulated thereon. Though much had been done since he became Manager in connection with the delivery of the gas to the public lamps and the private consumers, the special attention of the Board had, during the recent negotiations for a new public lighting contract, been called to the increased necessities of the future. In the past four months several new mains had been laid; and Mr. Watson, in the letter which reached the Board on the previous Saturday, reported that he was now able to considerably increase the pressures both at night and during the day. One could not give an approximate idea of the necessary outlay to attain the end in view—namely, the supply of gas to every public lamp at a minimum pressure of 2 inches (water gauge), and a sufficient pressure in the daytime for gas for cooking, heating, and manufacturing purposes. He recollected the time when the use of gas in England was practically *nil* during the daytime; now it was not unusual to find its consumption was as high during the hours of daylight as, and even higher than, in the evening and at night. The residents and industries in Calcutta were now prepared to use gas for domestic and industrial purposes; so that there was every encouragement to boldly take in hand the necessary steps and spend money to meet the increasing business waiting for the Company. After much consideration, the Directors had enlarged and re-arranged their English Staff in Calcutta. They had appointed Mr. Snelgrove, of Bradford, as the Chief Distributing Engineer, and Mr. Bone, of the Commercial Gas Company's works, as his principal assistant. These gentlemen left England by P. & O. steamer *Caledonia* on Oct. 14 and arrived at Calcutta on the 8th inst. Mr. Snelgrove was to be responsible for the distribution of the gas. He would first thoroughly examine the districts supplied, and report as to what was necessary to be done from time to time to meet the requirements of the Company's customers, whether public or private. The Directors had, under his advice, already ordered a complete compressing plant and other accessories for erection at the Sealdah Gas-Works. They might hope that these would be in action in the early part of 1910, and would considerably facilitate the investigation of the requirements for the enlargement and re-arrangement of the mains. Mr. Watson would, of course, remain the Company's representative in Calcutta—their Chief Engineer and Manager; but he would be relieved of the arduous duties connected with the distribution of the gas. When one considered that Calcutta was the second city of the British Empire, and that the Oriental Gas Company was the sole purveyor of gas there, it must be seen that the steps which had been, and would have to be, taken, prior to the commencement of the new public lighting contract, were such as would commend themselves to the proprietors and to the authorities and residents in Calcutta. Concluding his remarks, he might say that, humanly speaking, he saw no difficulty in anticipating that the present rate of dividend would not be reduced, but that in the future the Company's prosperity would be at least maintained, if not increased.

Mr. H. D. Ellis seconded the motion.

Mr. J. H. Mackay observed that the Chairman had made no allusion to the very vital question as regarded the future of the Company, and as to the contract with the Municipality of Calcutta. Reference had been made to the question in various ways; but the Chairman did not tell the proprietors whether any definite contract had been arrived at.

The Chairman replied that, if Mr. Mackay would kindly refer to the Directors' report, he would see the matter was fully dealt with there in the following terms:

> At the last two meetings of the proprietors, allusion was made to the Corporation's request for tenders for the future lighting of the City of Calcutta. More than one tender has been submitted by the Company to meet the varying views of the Corporation. Ultimately, in the spring of this year, negotiations were carried on by the Board in London with Mr. Alfred Mansfield, the accredited Technical Adviser of the Corporation; and, after several protracted interviews, terms for a new contract for the supply of gas to the public lamps from the 1st of May, 1911, were agreed on, and were finally accepted by the Corporation on the 8th of September, subject to the sanction of the local (Bengal) Government. Under the new contract (which is to be for a period of twenty years), an improved supply of gas will be furnished to the city at increased pressures.

Mr. G. F. Thompson: Is it pretty sure it will be ratified?

The Chairman: We have every reasonable expectation it will be.

Mr. Thompson: We are making a large expenditure over it.

The Chairman: But we shall not require to raise any additional capital.

Mr. Mackay: Are we to understand that no definite arrangement has been come to with the Corporation?

The Chairman: Our report says: "Finally accepted by the Corporation, subject to the sanction of the local (Bengal) Government."

Mr. Mackay: The sanction has not been obtained yet.

The Chairman: It has not been given.

Mr. Louis Penny: That is merely a matter of form.

The Chairman: We cannot approach the Bengal Government. It has been their holiday time; and there has been no session.

The motion was unanimously carried.

Proposed by the Chairman, and seconded by Mr. R. Miller, a dividend was declared of 8 per cent. for the year (less 3½ per cent. already paid), free of income-tax.

Moved by Mr. Ellis, and seconded by Mr. W. Williams, Mr. A. T. Eastman was re-elected a Director.

Mr. Eastman, in his reply, remarked that business men like the proprietors would realize that, owing to the negotiations which had been referred to, the life of a Director of the Company had been a strenuous one for some considerable time past; but whatever efforts were necessary, his colleagues and himself were always willing to make them in the furtherance of the proprietors' interests.

On the motion of Mr. R. B. Fitzmaurice, seconded by Dr. Charles Sangster, the Auditors (Messrs. S. W. Savage and F. Seel) were re-appointed.

Mr. T. W. Forman proposed a resolution according the best thanks of the proprietors to the Chairman and Directors for their services during the past year. He remarked that the Board must have had an anxious time; and he was glad to think it was all over.

Mr. W. C. Ellison seconded the motion, which was unanimously carried.

The Chairman, having acknowledged the resolution on behalf of himself and his colleagues, moved a vote of thanks to the Manager, the Assistant-Manager, the Secretary, and the staff generally both in Calcutta and in London. He said the proprietors could all understand the anxiety that Mr. Watson had had during the past twelve months at the very least in connection with the public lighting contract. He was sure—seeing the different nationalities comprising the Municipality of Calcutta, and the different views existing in opposition to any concern which was not owned by the inhabitants—Mr. Watson must have had a great deal of trouble, and without great resolution and marked ability he would never have been able to have got through the difficulties himself on the spot. Several negotiations were conducted by him, which meant many cables. He also came home this time last year; and the Board discussed the matter with him, and gave him full authority to carry out their views. But by the time he again reached India, the views of the Corporation had changed. They set aside altogether what had theretofore been done, and went entirely upon new lines. Ultimately, after endeavouring to get a gentleman from England as Consulting Engineer to go out there to advise them, they arranged with Mr. Mansfield to undertake the duties, and to negotiate with the Board. Mr. Mansfield came over; and they had several negotiations with him of a protracted character and some difficulty. Eventually, however, they parted from Mr. Mansfield exceedingly good friends. The result of the negotiations had been confirmed by the Corporation. Mr. Mansfield was now in Calcutta. He arrived there a few days ago; and he would negotiate further upon the second contract—that was to say, whether the Company would on May 1, 1911, continue to light and extinguish the lamps, or whether the Corporation would undertake the work. So they had this second contract to consider between now and 1911. Meantime they had to get the mains arranged and enlarged, so as to meet the demands and requirements of the new contract. He had already spoken of Mr. Watson's difficulties and abilities; but he might say further in regard to him, that they hoped to have the pleasure of seeing him home next year, when he was due on furlough. He had had but little holiday the six years he had been their Manager; and he had had his hands thoroughly occupied both inside and outside the works, more especially inside. With reference to the staff in India, the members were all working very satisfactorily. They were not troubled as were, in Italy, a Company of which he was formerly a Director, with labour questions. Mr. Watson's great kindness to his men was fully appreciated, and they worked harmoniously with him. As to the London staff, their friend, Mr. Luff, had been most attentive during the year. He had had a great deal of extra work thrown upon him; and he had worked hard and most satisfactorily. He (the Chairman) believed that the Directors would have the pleasure of giving the proprietors, the next time they met, a very good report as to the condition and prospects of the Company.

Mr. Ellis, in seconding, said he had much pleasure in confirming everything the Chairman had said with regard to the efficiency of the staff both in this country and in India. As the proprietors had been informed, the Indian staff had recently been augmented by sending out a Chief Distributing Engineer, and an Assistant. The Board had every confidence that the gentlemen appointed would prove valuable additions to the staff, and quite equal in ability and zeal to those who were already giving their services to the Company out in India. The Board took a great deal of pains to obtain the services of two thoroughly efficient men; and he thought they had succeeded. Mr. Snelgrove came from an excellent school in the North (Bradford), where he put in many years of good service under the Municipality. He had also had experience of gas-works abroad. As to Mr. Bone, he had been with the Commercial Gas Company for the last four years or so. He was most highly appreciated; and they were very sorry to lose him. At the same time the Directors of the Commercial Company would not like to stand in the way of his advancement in life, and promotion to greater things. He (Mr. Ellis) also wished to say a few words with regard to the point raised by one proprietor as to the sanction of the Bengal Government not having yet been given to the contract. The Board had no misgivings whatever about that; and the proprietor might also dismiss any misgivings he might have in his mind. Things moved very slowly in the East. It was 21 months from the date of the lodging of the tenders before the agreement was finally accepted by the Corporation, on Sept. 8. Between then and the beginning of November was the holiday season; and he did not suppose any

matters had been before the Government. In due time, however, this contract business would be reached; and though it might take some weeks, they had good reason to anticipate that the sanction would be granted.

The motion was cordially agreed to.

Mr. LUFF thanked the proprietors on behalf of his colleagues and himself. Their and his own exertions had been heavy during the past twelve months. They knew they had the full appreciation of the Chairman and Directors; and he was glad indeed that their opinion was endorsed by the proprietors. He would communicate the resolution to Mr. Watson.

TICEHURST WATER AND GAS COMPANY'S AFFAIRS.

Another Stormy Meeting with Little Result.

The Adjourned Meeting of the Ticehurst and District Gas and Water Company was held last Tuesday, at the Institute of Chartered Accountants, Moorgate Street Place, E.C.—Mr. W. B. MARTIN (the Chairman of the Company) presiding. It will doubtless be remembered that at the previous meeting, held on the 27th ult. (*ante*, p. 336), an adjournment was resolved upon in order that the accounts might be properly audited by Messrs. Saker and Davis, the Company's Auditors.

The CHAIRMAN opened the meeting with the announcement that the intended audit had not been made; Messrs. Saker and Davis having refused to proceed without some satisfactory guarantee for the payment of their charges. The Receiver recently appointed on behalf of the debenture holders declined to give the required guarantee; and the Company were without either funds or income. The Chairman read the correspondence which had taken place on the subject between Messrs. Saker and Davis and the Company, and between the same firm and the Receiver; and he concluded by expressing his regrets and those of his fellow-Directors that the meeting should be confronted with a disappointment. He added, however, that no blame attached to Messrs. Saker and Davis, who were merely looking after their own interests in a perfectly regular manner. Personally, he was of the opinion that, even if proceeded with energetically, a full audit could not have been made in the time allotted.

Mr. HOOPER inquired if the meeting was to understand from the Chairman that the Company were making no disbursements whatever, and if there were literally no funds to meet small disbursements. He said his own impression, received at the previous meeting, was that the Company were still collecting some rental from the small business remaining.

The CHAIRMAN stated that all receipts were regularly turned over to the Receiver, and literally no funds, even to meet petty expenses, remained in the Company's treasury.

Mr. HOOPER adverted to the £8265 stated at the previous meeting to be due on shares held by Mr. Eaton, a former Managing-Director, and a corporation of which that gentleman was the guiding spirit; and he asked the Chairman if since the last meeting either he or his colleagues on the Board had taken any steps to recover this money.

The CHAIRMAN said nothing had been done in the matter, and explained that this inaction on their part was owing to his colleagues and himself having placed their resignations at the disposal of the previous meeting.

Mr. HOOPER suggested that perhaps the Chairman would not mind furnishing some equally satisfactory explanation of the reason why neither he nor his co-Directors had endeavoured to collect this money for the Company during the two years they were in office (from 1907), in which period it had been stated by the Chairman it was found necessary to borrow money to keep the concern afloat.

This explanation was not forthcoming, though the request was made several times, and in many different forms.

Mr. HOOPER thereupon abandoned the point, and asked for an explanation of the discrepancy between the Chairman's statement that this money—or rather £3000 of it—was personally due by Mr. Eaton, and the balance by his corporation (the exact name of which nobody seemed able to give), and the point-blank denial by Mr. Eaton that he owed the Company any money.

The CHAIRMAN replied that he was not prepared to furnish the requested explanation, but suggested that perhaps the meeting might be not unwilling to have the matter explained by Mr. Capes, of Messrs. Archer and Capes, the Accountants who furnished the report read at the previous meeting, which, by resolution, was placed in the custody of the Receiver.

This suggestion was met with loud expressions of disapproval. After a time, however, Mr. CAPES was heard to say that the books showed that £8265 was due to the Company by Mr. Eaton and by his corporation.

Mr. HOOPER said he had no doubt that the statement of Mr. Capes was made in all sincerity; but his information came solely from an examination of the books, and he could have no knowledge of the conditions under which these shares were issued to Mr. Eaton and his corporation. What the meeting was trying to arrive at was the genesis of the business, and he (Mr. Hooper) hoped the Chairman would not consider him to be pressing the point unduly if he again asked for an explanation direct from the chair.

The CHAIRMAN again protested his utter inability to comply with the request.

Mr. Hooper then proceeded to demand the minute-book containing the record of the transaction. This, however, was not forthcoming; and amid a volley of questions, the Chairman was heard to ask Mr. Eaton to give his explanation of the matter. Mr. Hooper protested against this as an evasion by the Chairman of his manifest duty to the meeting; and a scene of considerable disorder ensued. When quiet was restored,

Mr. EATON was found to be making an explicit denial that he owed the Company any money. He stated most emphatically that the shares for which it is alleged the money was due were given to him as collateral security for money lent to the Company. Furthermore, he said the loan had been repaid; and he had returned the scrip for the shares.

The CHAIRMAN (interrupting) stated that he had no knowledge of the shares having been returned.

Mr. EATON, however, insisted that they had been.

Thereupon the record book was demanded, but in vain; and, after a time, it was decided that the return or non-return of the shares was of less moment than the conditions under which the Company had issued them. After a discussion which was acrimonious throughout, and threatened to become heated, a minute-book was seen to be in the hands of the Chairman, and quiet ensued. The reading of the minutes of a meeting held on Jan. 18, 1905, disclosed the issue of 1400 shares of the Company to the Gas and Water Works Supply and Construction Company; the consideration stated as being for 2½ miles of gas and water mains.

Mr. HOOPER followed up this disclosure by some sarcastic references to the condition of the memory of the Chairman, who, though, as the record showed, he actually presided at the meeting in question, had until the present moment been unable to state in what circumstances a large number of shares had been issued. But, continued Mr. Hooper, this was not all. Though it would have been perfectly simple to have verified the issue by a reference to the minute-book, no such precaution was taken. As a consequence, such meagre statement of assets as had been vouchsafed to the shareholders of the Company contained an item for a large amount which that day's evidence had shown was not, and had never been, owing. To put the matter in the mildest form, the affair was most discreditable to the Directors.

At this point, Messrs. Saker and Davis were questioned as to whether it would not be possible for them, after a cursory examination of the books, to furnish some idea as to the condition matters were in; and the answer was in the affirmative.

Mr. GLOVER thereupon moved that the meeting be adjourned for four weeks pending the preparation of their statement. He characterized the report read by the Chairman at the previous meeting as "disgraceful and fraudulent."

These remarks were followed by a noisy hubbub; Mr. Capes and the Chairman protesting strongly against Mr. Glover's observations. Eventually Mr. Glover's Solicitor withdrew the word "fraudulent."

Mr. HOOPER thereupon seconded Mr. Glover's motion as amended; and the meeting then stood adjourned for four weeks, at the same place—Mr. Glover's Solicitor undertaking to give notice to all the shareholders.

A PROPOSED ELECTRICAL COMPANY FOR CARMARTHEN.

In the "Welshman," there has appeared a lengthy article pointing out the advantages of gas and some unfortunate experiences in connection with municipal electrical concerns. In putting his facts forward, the writer (who signs himself "A Gas Consumer") has in mind a suggested development in Carmarthen, as the following quotations will show: "Various rumours are afloat in the town as to the progress of the Carmarthen Electric Light Company, which has so long been in embryo, and which now, it would appear, threatens to blossom forth into actual existence. Recently a paragraph appeared in the newspapers that the Company had been formed, and that the subscribers were several lady clerks, whose names were given. Now, however, it is stated that certain local gentlemen have at last been induced to join the subscribers, and have taken parcels of shares varying in number from 250 to 50 each. Several of them are even named as prospective Directors; and these gentlemen, at any rate, are to be congratulated, for they at least, by the receipt of Directors' fees, will be sure of receiving something in return for their capital. Can it be for a moment thought that an Electric Light Company has any real prospect of success in a small town like Carmarthen, without any industries, and without any really great shops whose proprietors might even for a time be induced to take a supply of the current? As to the private consumer, the number of individual gas consumers is not so very great; and it is certain that only a very small proportion of them would be converted to electric lighting. The mere contract price for street lighting—£680—though it has been secured for fourteen years, can never pay the promised interest of 5 per cent. on a capital of £10,000, as it must not be forgotten that out of this working expenses have to be met. That the streets will not be better lighted than with incandescent gas is indisputable; and though I am not in favour of any lengthened contract with any Company, it is much to the discredit of the Town Council that, as they were entering into such a contract, they did not accept the offer of the Gas Company. The accepted tender at £680 per annum for electric light is for 51 lamps of 48-candle power, and 181 of 28-candle power—making a total of 7516 candles, which is less light than is at present supplied; while the Gas Company offered to supply all the 232 lamps, of at least 70-candle power each, making a total of 16,240 candles, for £667."

Carmarthen Employees' Bonus Scheme.—We learn that an interesting ceremony was quietly carried out at the Carmarthen Gas-Works on the 16th inst., when two of the Directors attended for the purpose of signing the agreements with those employees who had been accepted to participate in the benefits of the bonus scheme. The principles of the scheme, which will date from July 1 last, were explained to the men some few months ago. It has been adopted in order to encourage the employees to take an interest in their work, and make them feel that they will have some tangible result for their efforts. The manner in which they will participate in the profits is by a percentage on their wages, calculated upon the price of gas. A standard price is fixed at which no bonus is paid; and when the price is reduced, a percentage is added for every 1d. per 1000 cubic feet reduction. This scheme will not affect the shareholders in so far as the maximum dividend is concerned—that being definitely fixed; but it was considered that the general welfare of the Company would be improved, the consumers benefited by a reduced price, and the employees have the satisfaction of feeling a personal interest in getting the price as low as possible.

VIENNA GAS-WORKS.

Extraordinary Speech by Dr. Burgomaster Lueger—British Capital Given Notice to Quit.

The following article, with the above heading, appeared in last Thursday's "Financial Times."

A somewhat extraordinary speech was delivered last week in Vienna by Dr. Lueger, Burgomaster of the city, on the occasion of the tenth anniversary of the Municipal Gas-Works. Vienna's gas supply had for many years previous been entirely due to British capital; and the suburban supply is still being undertaken by the well-known English Company, with head office in London. As the main tenour of the speech, when unravelled from the various eccentricities which disfigure it as a business address to business men, seems to be that British capital is not wanted in Vienna—at least, by the party Dr. Lueger represents—we reproduce it for the British investor's consideration from the columns of the "Neue Freie Presse."

> It was always an item in our party's programme, said Dr. Lueger, to construct our own city gas-works; and when we came into power in the Corporation, it was our first thought to make this point of our programme a reality. But you will pardon me when I say that it was a difficult task. Our opponents knew how to keep us from getting money, whenever it was possible. Wherever we went, we found doors closed against us; and it was a long time before we could finally get hold of money to carry the gas-works through. All things have an end, and this trouble had an end too. On a certain day the protocol with the Deutsche Bank for the City of Vienna gas loan was signed. On the afternoon of the same day, the evening papers reported that the action brought by the Municipality of Vienna against the English Company was lost on the first hearing. The shot was well aimed; but, thank God, it was fired off two hours too late. You know that the second hearing confirmed the judgment of the first. Previously two eminent Austrian Counsel had declared the opposite standpoint to be the correct one. I shall not argue the point with the Judges; they will have settled the matter, I suppose, with their own consciences. One thing, however, is certain. Our opponents raised a shout of triumph over the victory of the English view of the law; they thought we were annihilated. But it did not turn out that way. Our trust in God held us erect; the Lord Our God did not abandon us. He sent us a mild winter; and we built away with energy, so it was a pleasure to look at. For this, we have chiefly to thank two men—Director Rosner and Oberbaurat Kapaun. At the right time, at the given hour, the city gas-works were completed. At the right time, Viennese light was in all the streets of our city; and I believe that at that time the city gas was received with universal acclamation. . . . We find ourselves now at the commencement of an important extension of the city gas-works, which is to supply what was once the suburbs and now the 21st ward with city gas, to establish the sole supremacy of Viennese work in Vienna. This will see its accomplishment; and I can say that, not I, but many of those who are here to-day, will see the day on which it will be definitely true to say, "In Vienna there is no longer an Englishman; only more Viennese." That I wish to-day with my whole heart.

These remarks, made by the first Municipal Authority in Austria-Hungary, are all the more notable as we have on various occasions recently been led to believe that English capital was wished for to assist, as in the past, in the development of the Dual Monarchy. Dr. Lueger describes the difficulties he encountered before being able to secure the loan he required from the Deutsche Bank, and that, apparently, owing to the fortunate accident of certain news being published two hours late, when the loan had just been signed. Whether Vienna will find the European loan market more amenable in the near future, may be open to doubt, in view of political possibilities when the State is once deprived of the controlling influence exerted by its present venerated ruler. In any case, it is not particularly encouraging to find such language indulged in by one who in his own country occupies a similar responsible position to that held by the Lord Mayor of London in ours.

FINCHLEY PUBLIC LIGHTING.

Local Government Board and the Proposed Electric Lighting Loan.

At the last Meeting of the Finchley Urban District Council, a letter was read from the Assistant-Secretary of the Local Government Board with further reference to the application of the Council for authority to raise £2200 for the provision of electric arc lamps in Ballard's Lane, Regent's Park Road, and the Great North Road, Finchley. The writer said he was instructed to explain that the Board's view was that before sanctioning a loan in this case they ought to satisfy themselves that the precise object for which it was to be granted was one which would be in harmony with the interests of the ratepayers throughout the currency of the loan. In considering this question, the Board must necessarily have regard to the relative advantages of other alternative systems of lighting available; and it was for the purposes of this consideration that they had requested further information from the Council. This information had not been forthcoming; and, in the circumstances, the Board's decision could only be that, in the absence of it, they did not feel justified in sanctioning the proposed loan. The Highways Committee recommended that no further action be taken in the matter at present. Mr. Boggan argued that the Local Government Board had no right to attempt to force the Council to use gas instead of electricity. This was, in his opinion, a distinct attempt on the part of the Board to force them into the hands of a Company who, when they had no competition in the form of electricity, were in a position to charge excessively high prices for a poor commodity. Mr. Rabbidge thought the letter of the Local Government Board was only what might have been expected from custodians of the public purse. It must be remembered that the Council had refused to make inquiries as to the cost of gas. Mr. Coltman reminded the Council that they had given an evasive answer to the Local Government Board, and therefore they could not expect any other reply than a refusal. In the result, the following motion was carried: "That a letter be sent to the Local Government Board to the effect that all available information asked for by the Board was supplied during the very lengthy and exhaustive inquiry held by the Board's Inspector; that the whole question of public lighting was thoroughly gone into at the time Finchley applied for, and obtained, electric lighting powers; that the decision then arrived at had been justified by the considerable reduction made in the price of gas; and that any prices offered by the Gas Company could only be regarded as competitive prices quoted for the purpose of undercutting the Council's undertaking, with an ulterior motive which it would not be in the interests of the ratepayers to entertain." The Chairman said it would be as well to announce now that they did not intend to take gas. They had their own electricity undertaking, and it would be madness on their part, under these circumstances, to employ gas for lighting the streets. It was not altogether a matter of price; it suited the Council to light the streets, as current was thereby used at a time when it was not required for other purposes.

MARYLEBONE BOROUGH COUNCIL.

Proposed Extension of Electric Lighting in the Streets—A Loan of £24,000 Needed.

At a Meeting of the St. Marylebone Borough Council on Thursday last, the following report was brought forward by the Electric Supply Committee.

We have had under consideration the resolution of the Council passed at their meeting on the 21st ult., instructing the Standing Committees to report as to any works that might be put in hand calculated to lessen the unemployment in the borough. In this connection, we have considered as to an extension of the work, now proceeding, of converting the public lamps from gas lighting to electricity.

The Council will recollect that when it was decided we should light the streets electrically, where our mains exist, there was considerable controversy, and that the London County Council refused our application for a loan of £8000 for the purpose, on the following grounds: (*a*) That the streets would not be better lighted if the change were adopted. (*b*) That we were not justified in adding to our heavy capital commitments, in view of the money that would undoubtedly be required for extensions in order to comply with our statutory requirements. (*c*) That they were not satisfied that the scheme would benefit the borough financially. (*d*) That the scheme would involve the destroying of a large part of the asset acquired by the borough at a cost of £11,000 when it provided incandescent gas-burners in the lamps some years ago. We dealt with these grounds of objection at the time; and in view of the experience gained since the date in question (March last), we have every reason to know that the case we then presented was sound in all respects.

The scheme adopted by the Council affected 1964 lamps; and up to date 1886 of the 1964 lamps have been changed over, at a cost of £5523. The remaining 78 are estimated to cost £265. The capital cost will thus be £5788, as against the original estimate of £8336, and the final estimate of £6886. The annual charge to the Lighting Committee will be £7350, made up as follows: Current at 1·42d. per unit, £3950; and maintenance, renewals, and capital charges £3400. Of the £3400, £2500 covers cost of repairs, renewals, maintenance, &c., the balance (with the profit on sale of current) going towards repayment of capital cost. The Lighting Committee paid for these 1964 posts £8818 per annum for gas and maintenance, and are paying £7350 for electricity and maintenance.

If we obtain a ten-year loan for the expenditure of £5788, our estimated profit of £2500 per annum would have been increased by £200, representing the charges on the substantial reduction in capital outlay. As it had been decided to regard the expenditure (the money for which has been borrowed from our net revenue account balance) as spread over a term of three years, the estimated profit of £2700 per annum is reduced by £1360 during the first three years, but increased for the remaining seven years by £700 per annum.

After taking over 165 more lamps, near which we have cables laid, there still remain 1385 lamps in streets where at present we have no mains. The price paid by the Lighting Committee to the Gas Company and to Messrs. Pontifex (the Contractors) for running these lamps is £5600. The Gas Company having now reduced their price for gas by 1d. (from 2s. 5d. to 2s. 4d.) per 1000 feet, this cost will now be £5500. If we were to lay the necessary ducts and put in mains of sufficient size for the lighting of these remaining lamps (1385), the capital cost of the mains and ducts would be (*a*) with ordinary labour £19,965, and (*b*) with "unemployed" labour £23,042. The cost of altering the lamps themselves, for the purpose of electric lighting, would be £1385. The above includes the full cost of the ducts, which we would here point out would be available for supply to private consumers along the route, and the laying of which at this juncture would open up fresh fields for the development of the business of the department. In presenting the following figures, we have assumed that the Council will elect to carry out the work by means of "unemployed" labour—notwithstanding the heavier cost.

It is proposed that we should spread the cost of alterations to lanterns, &c., as before, over three years, and that we should make application to the County Council for sanction to, and the advance of, a 25-year loan of £24,000 for the purpose of extending the mains (being the amount of the Engineer's estimate (B) and £1000 for contingencies). Having regard to the greater expense involved in taking over these lamps compared with the cost in streets where our mains were already laid, we think the Lighting Committee should agree the total charge (if the Council agree to the scheme in principle) at the amount of the present gas lighting—viz., £5500 per annum. Upon this point, we should hope to have an opportunity of conferring with the Lighting Committee.

The cost of alterations to lanterns spread over the three years would

be about £500 per annum. The annual interest and repayment charges of a 25-year loan for the mains and ducts would be £1490; and maintenance and renewal charges would absorb £1870 per annum, making a total for these services of £3860 per annum. Assuming the Lighting Committee agree the charge at £5500, this would leave £1640 per annum for the electricity, equivalent to 0·93d. per unit for the first three years, and 1·17d. per unit thereafter, instead of 1·42d. per unit, the price allowed us for the existing lamps. Although these prices are lower than the present street lighting charges, they would yield a profit, and we should have the advantage of paying off, earlier than we otherwise could do, the cost of laying the mains in the remaining portion of the streets—about 24 miles—where at present no mains exist. This, as the Council are well aware, it is very desirable to do, as we are anxious to push the sale of electricity in all parts of the borough. At the present moment, it is impracticable to supply applicants in the undeveloped areas, as the cost of laying the mains for individual supplies is prohibitive. It is estimated that, of the cost of laying these mains and ducts, £10,650 represents materials, £3110 the cost of skilled labour, and £10,667 will be unskilled labour. Unskilled labour would be in the nature of the navvy's work, and would employ about 400 men for sixteen weeks.

With regard to the contention of the County Council in refusing the loan—viz., the lighting by electricity is not as satisfactory as lighting by gas—there is no question that, in actual measured candle power, the streets have much more light than they had before, and that with regard to the general effect this is in every way satisfactory, the lighting being very equally distributed, and giving more efficient results in case of fog.

Briefly, the advantages of giving effect to the foregoing proposals are that, while the present suggestion will not be disadvantageous to the undertaking, it will be beneficial for the future in that a considerable amount of capital will be laid down in the form of mains from which future revenue will be derived as consumers come in; that electricity will be brought to the poorer parts of the borough and made available both for lighting and power in streets in which we cannot comply with applications at present, on account of the absence of mains; and that unskilled labour to the extent of 400 men would be employed for sixteen weeks. Benefit to the unemployed question would thus be given not only as to the actual employment but, at the end of the sixteen weeks, the men employed, if working throughout the period, ought no longer to be described as unskilled.

We commend the scheme to the Council; and as the matter is one of urgency—if any benefit is to accrue to the unemployed—we have asked the Lighting Committee to give it their prompt consideration, and the Finance Committee to bring up the necessary recommendation for application being made to the London County Council for sanction of the proposed loan of £24,000 for this purpose.

We recommend that we be authorized to carry out the completion of street lighting by electricity throughout the borough in accordance with the details of the scheme set forth above, subject to the Lighting Committee concurring therewith and to the London County Council sanctioning the loan.

Alderman DEBENHAM (the Chairman of the Committee), in moving the adoption of the report, pointed out that work would be found for 400 men for sixteen weeks at 25s. per week.

Mr. GARROULD seconded the motion. There were, he said, 24 miles of streets in which the main and ducts were not down; and to put them in would be a great advantage to the electric light undertaking, because then they would be able to connect up a number of consumers.

Colonel MAUDE criticized the figures given in the report, and asked how it was that some members of the Council objected to discussion taking place on proposals put forward by the Committee. Why should not these proposals be discussed? He objected altogether to adding to the capital of the concern. He had prophesied that when the £8000 was asked for, that was only the thin end of the wedge; and his statement had been justified. He believed that the Committee and the Council required advice, and recommended them to go to the Local Government Board. They had had rosy accounts of profits; but he did not feel that these accounts were justified. In view of the enormous debt, he hoped the Council would hesitate before adding another £24,000 to it.

Mr. RUSSELL said they had had a great deal of "expert opinion"—too much, in fact. He thought, however, that the Supply Committee should not be hampered. The poor streets should be as well lighted as the others; they paid as much in proportion. The Chairman of the Committee had been very courageous throughout; and it was remarkable that the borough electrical undertaking had been so successful as it had been.

Alderman DENNIS moved as an amendment that the Council should decline to give a decision until the report of the Lighting Committee had been presented to them. If the Council had this report, they would be prepared to vote, but not otherwise.

Alderman MARTIN MORRIS seconded the amendment, and said that the Gaslight and Coke Company had never been given a chance to see what they could do in the way of illumination at the same cost. He believed in healthy competition. The Company should be enabled to show what they could do at anything like the same figure as electricity cost.

Mr. NONWEILER gave the views of the Lighting Committee, of which he is Chairman. The Committee, he said, had considered the present scheme, and had decided to concur in it—making, however, several stipulations, one of the latter being that the Committee considered that they ought not at any time to pay more for the electricity than for a corresponding supply of gas. Recently the Committee noticed the Gas Company had reduced their prices for public lighting; and this had affected them in making the stipulations referred to.

Councillor DUNN said if there was any competition in regard to the electric lighting, it should be carried on in a fair way. It was curious that the unskilled labour question should be dragged in.

Mr. FETTES said there could be no misunderstanding in the matter. The Council knew perfectly well that the subject was brought up by the Electricity Committee with the object of carrying out the special instructions of the Council to help the unemployed. In his opinion, the matter should not be postponed. If it was delayed, the Council would have to give up all hope of doing anything for the unemployed during the winter.

Mr. J. LEWIS spoke in support of the amendment. After the information Mr. Nonweiler had given them, he really thought it would be well to have further opportunity of inquiring into the matter. It seemed that even the figures put forward in the report were not accurate.

Alderman ANGLIM said that if there was one thing advocated at the recent elections, it was that useful work should be found for the unemployed.

The amendment was decisively defeated; and the MAYOR declared that the motion had been carried *nem. con.*

AN EX-COUNCILLOR ON MUNICIPAL TRADING.

In opening a discussion on "Municipal Trading," in the County Forum, Manchester, a few days ago, Mr. J. W. J. Cremlin, an ex-councillor, declared emphatically that he was "against municipal trading out and out." He objected to it because, in his opinion, it was entirely foreign to the original intention of Parliament in conferring on municipalities the very large and very wide powers of local government. The function of municipal government ought, he said, to be strictly confined to matters which were the subjects of government rather than to those that appertained to trade, business, or industry. Sanitation, the public health, the administration of the highways, and so forth, were the original functions directly conferred on local government; and since then Parliament had, by a specific Statute, enlarged the boundary of what he might call strict municipal function by charging corporations with the duties of administering the Education Act and the Old Age Pensions Act. He considered that the municipalities of this country had a sufficiently onerous duty to discharge in carrying out the great Acts of Parliament appertaining to public health, education, and old age pensions, without including in it the domain of private enterprise. He was a stern opponent of municipal trading, because he believed that, in the attempt to engage in all kinds of speculative enterprises, corporations had failed to discharge to the best advantage those functions of government which were originally entrusted to them.

Forty years ago, when the governing bodies of towns concentrated their minds on matters of government rather than of trade, the entire cost of municipal government throughout the country was £36,000,000. This amount had increased five times, and at the end of last year the total cost of municipal government was £162,000,000. This great advance coincided with the rapid increase in municipal trading activity; and he believed that a vast amount of the debt was due to bad management. He did not say bad intentionally, but due to the fact that the heterogeneous body of men in the Councils—men with wide sympathies and large views, no doubt—were absolutely incapable of managing the various commercial businesses entrusted to them. The result was that these were expensively and extravagantly managed, and public money was thrown away in a fashion that it would not have been if private companies had carried on the businesses.

The debt of the Corporation of Manchester to-day stood at approximately £23,000,000; and the paper value of their assets was returned at £30,000,000. But any commercial man knew perfectly well that the paper value which a corporation, or, indeed, a private individual, might place on his available assets was not by any means the sum which these assets would realize if put up for sale, especially a forced sale. He did not believe they were getting value for the expenditure that was taking place, and that the vast amount of the expenditure was due to the leakage and bad management which were the result of endeavouring to do too much. However able the representatives on any council might be, they were not experts in the various municipal undertakings that a corporation now carried on. The result was that corporations, generally speaking, left more and more in the hands and under the control of the highly-paid official in the Town Hall; and the result was that gradually there was growing up throughout the length and breadth of the country a dictation, a will, a tyranny by a class of officials, instead of government by the representatives of the people themselves.

An Evening at the Chichester Gas Workers' Club.

The "Chichester Observer" for last Wednesday contains an appreciative article, by an old resident of Chichester, on the Gas Workers' Club, at which he spent the previous Friday evening. After describing the room and the various kinds of amusements to be found therein, not only for the employees, but also for their wives and children, he says: "The management of the Gas Company, to whose initiative this splendid work is wholly due, are to be highly congratulated, not only upon the remarkable success and vitality of the movement, but also upon the enterprising and broad-minded policy towards their working staff which the provision of the beautiful room and all its appointments indicate." He regards the success of the movement as largely attributable to the genial personality of the Company's Engineer and Manager (Mr. T. E. Pye), who is ably seconded by his wife. Mrs. Pye has for some years past conducted a weekly meeting of the women-folk attached to the club, where sewing, savings bank, and other business is conducted for the benefit of the homes represented; and both Mrs. Pye and the family have associated themselves in the work necessarily incident to the weekly and fortnightly entertainments. The writer considers that the inhabitants of Chichester have in their midst a movement the like of which, if adopted by all the large undertakings, would very "quickly dispose of our labour troubles, and could not fail to promote the well-being of the two great parties concerned—Capital and Labour—and be of an unbounded benefit to the whole of the community."

Extensions at the Abertillery Gas-Works.—At Abertillery last Tuesday, Mr. H. R. Hooper, M.Inst.C.E., one of the Local Government Board Inspectors, held an inquiry into the District Council's application for a Provisional Order, and for sanction to borrow £8800 for the extension of their gas-works. There was no opposition.

LIVERPOOL CORPORATION WATER SUPPLY.

Important Works Approaching Completion.

At the Meeting of the Water Committee of the Liverpool Corporation last Tuesday, Colonel Porter was elected Chairman for the current year. After expressing his thanks to his colleagues for the honour they had conferred upon him, and bespeaking their whole-hearted sympathy and assistance in discharging the duties of a position which had been so ably filled by his predecessors, he offered a few remarks on the work of the Committee. He said, though the most important of the new works on which they had been engaged during recent years had now been completed, or were approaching completion, there were several matters which would occupy attention in the course of the municipal year now beginning. The extent of the ordinary work of administration and maintenance in the department would be realized when it was remembered that the population now supplied with water by the Corporation was 1,120,000, and that it was increasing every year at the rate of about 12,000. For these new consumers new distributing mains had to be laid, and other arrangements and extensions made to provide the additional volume of water required. The diversion of the River Marchnant into Lake Vyrnwy, which was nearly finished, was an event of considerable importance, because it marked the completion of the Vyrnwy scheme so far as regarded the works required at the Vyrnwy end of the system for the full utilization of the gathering-grounds from which the Corporation were empowered to collect water. They propose to invite the whole Council early next year to celebrate this important event by a visit to the lake to witness the ceremony of turning on this valuable and final addition to their magnificent reserve. Any new works that might be required hereafter to bring more water from Lake Vyrnwy to Liverpool would be in the nature of aqueducts, and not works at the source of supply. On the aqueduct itself there still remained to be carried out some of the works designed as part of the second instalment of Vyrnwy water. The first of these in order of importance was a balancing reservoir at Malpas, the construction of which had been postponed while more urgent works had been receiving attention. Then there were strainers at the head of the pipe-line at Hirnant which had also been postponed; and, as the demand for water increased, more filter-beds would be required at Oswestry. In connection with the control over the distribution of water in and around Liverpool, the revision of the plumbing regulations had for some time engaged the attention of the Engineer (Mr. Joseph Parry, M.Inst.C.E.), and a new code would soon be ready for submission to the Committee. These were the chief matters that occurred to him as likely to demand the early attention of the Committee outside of the ordinary routine duties, and of the many, and often very important, matters that constantly arose in the course of administering an undertaking of the vast magnitude and complexity of the water-works required for the wants of the people of Liverpool.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The visit of the Western District of the Scottish Junior Gas Association to the Greenock Corporation Gas-Works this afternoon was interesting in view of the fact that only three years ago Mr. J. M'Leod, the Engineer and Manager at Greenock, was President of the Association. Mr. M'Leod is the first in Scotland that has risen from the ranks of the Association who has had the privilege of showing his works to his former colleagues. The visit would have been a pleasant one in any event, because of the cordiality with which the Association were received, both by Mr. M'Leod and members of the Corporation; but the sense of former comradeship must have heightened the feeling of respect on both sides. Mr. M'Leod has the charge of an important works—works which will give scope for his energies for some time before they are in what may be called a state of completeness. Given time and favourable conditions, however, there is every reason to believe that the work of betterment will proceed steadily; the Corporation being at present in a mood to go forward, and the Engineer being capable of advising them in their movements.

The Corporation of Glasgow have this week published intimation of their intention to apply for a Provisional Order for the consolidation of the statutes under which the Gas Department is administered. The first clause seeks the repeal of all or any of the Glasgow Gas Acts, 1869 to 1909, and the re-enactment and consolidation of all or some of them. Then follow in detail some of the powers which are to be asked for. These include a definition of the area of supply, which is defined as the city and the suburbs and adjoining places, which are enumerated, "and any other villages and places in the vicinity of the city, suburbs, places, and parishes before referred to, and other places intermediate and adjacent." The limits of supply it is proposed to divide into two districts—the city supply district and the supplementary supply district, in the latter of which authority is to be asked to charge higher prices for gas. Power is also sought to charge differential prices for gas for all purposes and in both districts. Authority to require anti-fluctuators on gas-engines is another power asked, as is also authority to pay superannuation allowances to employees. In the financial arrangements, it is proposed to make provision for the application of the revenue of the gas undertaking, and to authorize the Corporation to apply any surplus revenues for the benefit of the undertaking, or to pay the same to the credit of the Common Good fund of the city, or to apply them in the extinction of debt. The measure is a large one, and will entail a great deal of labour upon those who may be called upon to consider it.

This has been a week of prolonged and dense fog in the west of Scotland; daylight having been all but unknown in some places from Monday till Friday afternoon. In the "Glasgow Herald" of Thursday, in an article on the subject, the following statement was made: "A striking illustration of the effect which a spell of fog has upon the

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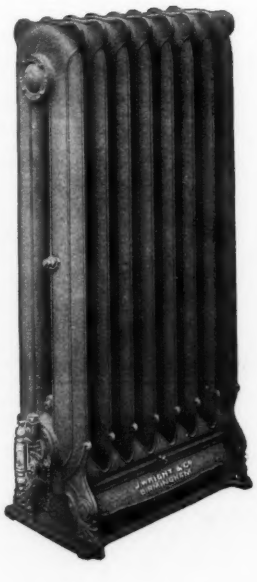

We have received an order for seventy-four "ST. ANDREW" RADIATORS for heating The White City, Manchester.

The "St. Andrew" is earning more golden opinions than ever!

The "St. Andrew" led the way from the first and still leads.

JOHN WRIGHT & CO.,
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Essex Works, BIRMINGHAM

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resources of the Glasgow Corporation Gas Department, and the expenditure which it involves upon the citizens, is furnished by the remarkable demand experienced for gas for lighting and heating purposes since the fog set in. During the 24 hours which ended at six a.m. on Tuesday, 32,720,000 cubic feet of gas were sent out from the works; but even this enormous quantity was exceeded during the 24 hours which ended at six a.m. yesterday morning, when a total of 37,245,000 cubic feet was delivered. This is the largest quantity ever sent out during the same period of time in the history of the Glasgow Gas Department. The previous highest records were: Dec. 23, 1904, 37,135,000 cubic feet; Dec. 25, 1905, 34,259,000; Dec. 21, 1906, 36,179,000; Nov. 25, 1907, 34,569,000; and Dec. 29, 1908, 34,830,000. The normal consumption of gas at this season of the year is about 27 or 28 million cubic feet; so that this was exceeded on Tuesday to the extent of 10 million cubic feet. The demand yesterday seemed to be equally great." Yesterday it was intimated, in the same newspaper, that the consumption of gas during the 24 hours which ended at six o'clock on Thursday morning was 35,119,000 cubic feet. To-day it is announced that there was again an exceptionally large consumption; but the pressure was reduced, to conserve the supply. The total quantity sent out in the 24 hours which ended at six o'clock on Friday morning—32,651,000 cubic feet—was below that of the preceding day.

It is announced that in Paisley, as compared with the same period of last year, there had been an increased consumption of gas to the extent of 49·2 per cent., though the increase on Tuesday was 86·2 per cent. The great demand for gas taxed to the utmost the producing power of the gas-works; but all demands, with the minimum of inconvenience, were successfully met by the Gas Manager, Mr. G. R. Hislop.

The inhabitants of the village of Ceres, in Fifeshire, at a public meeting on Tuesday evening, rejected a proposal for the lighting of the village. It was explained to them that, as the result of inquiries, it had been ascertained that the proposed scheme would entail an outlay of £50 to inaugurate, and a yearly charge of £25, which would mean a tax of 4½d. in the pound on the ratepayers; and that one half of them were unable to pay, and the other half were unwilling. It was consequently resolved to take no further action in the matter. There will, it is safe to say, be one house in the village which will be efficiently lighted, notwithstanding this resolution—that of Mr. W. Key, late Manager of the Tradeston Gas-Works in Glasgow, who is the owner of a system of lighting by means of petrol gas.

Mr. A. Milne has been appointed Convener of the Gas Committee of the Corporation of Aberdeen, in succession to Mr. W. A. Stewart.

The Town Council of Kirkcaldy held their second meeting last Monday evening for the purpose of considering the adoption of the Burghs Gas Supply (Scotland) Act, 1876; and they unanimously affirmed the previous resolution in favour of adoption.

At the sixth annual social gathering in connection with the Sick Benefit Society of the Edinburgh and Leith Gas Commission employees, held in Edinburgh last night, Mr. W. R. Herring, who presided, stated that the Society was in a prosperous condition. During the past year the income amounted to £290, while the expenditure totalled £188, which had been paid out to 87 members. It would, therefore, be seen that the fund was well established; and when it was remembered that in their last Provisional Order the Gas Commissioners obtained sanction to contribute to the fund when it was found necessary, this should be an additional incentive to join the Society. While they had an actual membership of 308, representing only 40 per cent. of the total number of employees, it might be reasonably expected that many more would join it. Even if a contributor did enjoy the best of health for a number of years, he would have the gratification of knowing that he had helped others.

Mr. H. Richardson, the Electrical Engineer to the Corporation of Dundee, on Tuesday evening asked the Electricity Committee for the appointment of a Sub-Committee to consider as to the lighting of common stairs by electricity automatically managed from the station. He stated that several tenements in the vicinity of the Dudhope Power Station had been fitted up with the necessary appliances. He wished a Sub-Committee to go into the whole question. This was unanimously agreed to.

The Corporation of Aberdeen have this week given notice of application for a Provisional Order, in which they are to seek powers to proceed with the procuring of a new water supply from the River Avon, a tributary of the River Spey. The measure is likely to be fiercely opposed by the proprietors of lands affected.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Nov.* 20.

Sulphate of Ammonia.

So far as fresh orders for near delivery are concerned, the market has been dull and uninteresting; but dealers apparently still have sufficient uncovered sales on their books to enable them to make use of all the present output, and values have been sustained at £11 1s. 3d. to £11 2s. 6d. per ton f.o.b. Hull, £11 2s. 6d. to £11 3s. 9d. per ton f.o.b. Liverpool, and £11 3s. 9d. to £11 5s. per ton f.o.b. Leith. Makers continue to quote £11 7s. 6d. to £11 10s. per ton for forward delivery, according to the period required and the port of shipment; but there is speculative offering abroad at considerably less money.

Nitrate of Soda.

The position of this article has not improved, and values are barely maintained at 9s. 3d. per cwt. for 95 per cent. quality, and 9s. 6d. for 96 per cent., on spot.

LONDON, *Nov.* 22.

Tar Products.

Markets for tar products have been quiet throughout the past week. Pitch is steady without very much change in price. Business has been done on the east coast at prices varying from 25s. to 26s. per ton; and on the west coast at equivalent figures. There has not been very much demand from the Continent, and buyers still appear to be holding off

SHOT No. 5.

THE

"TORRID"

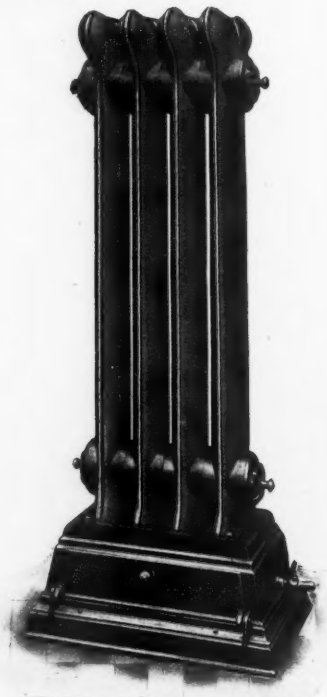
Gas Heated Radiator.

PURE HEATED AIR.

NO FUMES. NO FLUE REQUIRED.

With Trivet Door Front and Back and Copper Reflectors.

The Doors, Front and Back, can be opened, and form convenient Trivets, and at the same time, when opened, the Copper Reflector which is fitted inside becomes visible and produces a very pleasing appearance.



CANNON IRON FOUNDRIES, LTD.,

DEEPFIELDS, Near Bilston, Staffs., Eng.

London Office and Show-Rooms: 18, HOLBORN VIADUCT, E.C.

Australasian Agents: JAMES HURLL & CO., Ltd., 20, Loftus Street, SYDNEY, and Box No. 4 (G.P.O.) Dunedin.

in the hope of lower prices. Creosote is quiet. Business is reported to have been done in London at 2¼d.; but the large makers are evidently well sold, and prefer to wait for the present. In the North, oil is quiet, and business is reported at 2d. Benzol is steady at existing prices. There is a good demand for toluol. Solvent naphtha is firm, and there appears to be a shortage in this article in some districts. Carbolic acid is very quiet; but the Continental consumers are evidently very well stocked with crude. Crystals are very dull, and are reported to be selling at very low prices. Tar maintains its value.

The average values during the week were: Tar, 13s. to 17s., *ex* works. Pitch, London, 26s. to 26s. 3d.; east coast, 25s. 3d. to 25s. 9d.; west coast, 24s. to 25s. f.a.s. Mersey ports, 25s. f.o.b. other ports. Benzol, 90 per cent., casks included, London, 6⅛d. to 6⅜d.; North, 5⅜d.; 50-90 per cent., casks included, London, 7⅛d.; North, 6⅛d. to 7d. Toluol, casks included, London, 9⅛d. to 9⅜d.; North, 9d. Crude naphtha, in bulk, London, 3⅜d. to 4d.; North, 3⅛d. to 3⅞d.; solvent naphtha, casks included, London, 1s. to 1s. 1d.; North, 11½d. to 11⅝d.; heavy naphtha, casks included, London, 10⅜d. to 11½d.; North, 10d. to 10¼d. Creosote, in bulk, London, 2⅛d. to 2⅜d.; North, 2d. to 2¼d. Heavy oils, in bulk, 2⅜d. Carbolic acid, 60 per cent., casks included, east coast, 10⅛d. to 10⅜d.; west coast, 10½d. to 11d. Naphthalene, £4 10s. to £8 10s.; salts, 37s. 6d. to 40s., packages included and f.o.b. Anthracene, "A" quality, 1¼d. to 1⅜d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article has been quiet throughout the past week, and there has not been very much business doing, though in some instances a fair price has been paid for spot lots, seeing that dealers have probably some quantity to cover. In London, the principal Gas Companies quote £11 5s. for prompt, and £11 8s. 9d. for January-June. Outside makes are selling upon Beckton terms at £10 18s. 9d. to £11, and London terms are about the same. In Hull, the market is £10 18s. 9d. to £11. In Liverpool, the price is about £11 1s. 3d.; and £11 3s. 9d. is reported to have been paid for immediate shipment. In Leith, business has been done at £11 5s. for prompt, and £11 7s. 6d. for January-June.

Regulating the Size of Gas-Pipes at Nottingham.—The Nottingham and District Master Plumbers' Association welcomed the Mayor (Mr. A. Ball, J.P.) to their rooms on Monday night last week. The Mayor addressed a few remarks to his fellow-members, giving them advice beneficial to themselves and the city generally. He said he intended advocating to his colleagues on the Gas Committee, of which he is the Chairman, the issue of a code of regulations governing the sizes of pipes to be fixed in all buildings receiving their supply of gas from the Corporation. It is stated that master plumbers are confident that, in the event of this progressive measure coming into force, and being made compulsory, very little will be heard in the future of the delinquencies of the Gas Department.

COAL TRADE REPORTS.

Northern Coal Trade.

Except where lack of steamers interferes with the shipment, the coal trade is rather more active in both the chief classes of fuel. In the steam coal trade, the demand is fair; and for best Northumbrian steams, the quotation is from 10s. 6d. to 10s. 9d. per ton f.o.b., second-class steams are from 9s. to 9s. 3d., and steam smalls from 5s. to 6s. There is now a fuller demand setting in for next month, which is a period of short work through holidays. In the gas coal trade, the inquiry grows rather more pressing, as the great users desire to accumulate stocks for the heavy consumption at the turn of the year; and the exports are also heavy. Durham gas coals vary from 9s. 9d. to 11s. per ton f.o.b. for the usual classes, according to quality; while for "Wear specials," the quotation is up to about 11s. 6d. A contract for second-class gas coals for shipment to the Mediterranean over next year is reported. It is for about 100,000 tons; and the accepted price is expected to leave about 10s. 6d. per ton f.o.b. Some other contracts are in the market; but with the unsettled condition of labour under the Eight Hours Act coming into operation here at the end of December, there is some uncertainty as to the prices that may rule. Coke is firmer; and gas coke, despite the larger output, seems to be strongly held. Good gas coke is from 13s. to 13s. 6d. per ton f.o.b.

Scotch Coal Trade.

The market has been more active, there being a better foreign demand. The cold weather has improved the position of the home market for household purposes. Steam coal is not in any greater request. The prices now quoted are: Ell 9s. to 10s. 6d. per ton f.o.b. Glasgow, splint 10s. to 10s. 3d., and steam 9s. to 9s. 3d. The shipments for the week amounted to 314,291 tons—a decrease of 9130 tons upon the previous week, but an increase of 4387 tons upon the corresponding week of last year. For the year to date, the total shipments have been 13,401,571 tons—an increase of 516,473 tons upon the corresponding period.

The annual social gathering of the officials connected with the engineering departments of the different stations of the Manchester Corporation gas undertaking was held last Saturday evening, at the Albion Hotel, Piccadilly, in the city. There were about 60 present, including the President, Mr. J. G. Newbigging, the Chief Engineer. There was a whist drive, and four prizes were offered; the first being given by Mrs. Newbigging, and the others by the Managers of the different stations. Following the whist drive, and after refreshments had been partaken of, the room was cleared for dancing; Mr. C. E. Woodhead officiating as master of the ceremonies. The programme included several songs; and a very pleasant evening was spent. The prizes won in the whist drive were presented to the successful players by Mr. Newbigging; and he was accorded a hearty vote of thanks for his services.

Richmond's "A.B.C." Gas Fires.

LARGEST SALES ON RECORD!

1. BECAUSE they give the greatest amount of radiant heat for the lowest possible consumption of gas.
2. BECAUSE of their interchangeability of parts: **14** sizes, **5** designs, and only two sets of parts required for renewals.
3. BECAUSE of their scientific superiority in construction.
4. BECAUSE every fire is tested by EXPERT MEN before despatch.

ARABIAN.

BAVARIAN.

CASTILIAN.

Advertisement of the RICHMOND GAS STOVE & METER CO., LTD.
London Offices and Show-Rooms: 132, Queen Victoria Street, E.C. General Offices and Works: Warrington.

New Joint-Stock Companies.

The Liphook Gas Company, Limited, has been registered with a capital of £5000, in £10 shares, to carry on the business of a gas and water company in all its branches. The Tilley High-Pressure Gas Syndicate, Limited, registered with a capital of £50, in 1s. shares, has been formed to carry on the business of lighting and heating engineers, gas-fitters, sanitary engineers, &c.; also to enter into an agreement with Messrs. T. W. Brown, R. Riches, and W. H. & F. C. Tilley. The Hercules Incandescent Mantle Company, Limited, has been registered with a capital of £20,000, in £1 shares, to purchase or otherwise acquire interests in any patents, &c., conferring an exclusive or non-exclusive right to use, or any secret or other information as to any invention in relation to, incandescent mantles, and apparatus therefor; and in particular to acquire from E. Seymour, of 24, Whitcomb Street, Pall Mall East, S.W., the benefit of certain existing inventions in relation to improvements in the manufacture of incandescent bodies; and also to enter into an agreement with him.

Progress of the Island Barn Reservoir at Molesey.

Our readers may remember that about this time last year a commencement was made with a storage reservoir, having a water area of about 120 acres and a holding capacity of 1000 million gallons, for the Metropolitan Water Board, at Island Barn, Molesey. It was put in hand rather sooner than was originally intended, at the suggestion of the President of the Local Government Board (the Right Hon. John Burns), with the view of giving employment. In the twelve months which have elapsed since the first turf was cut, the puddle trench has been completed, and the embankment formed around the entire reservoir for heights varying from 3 to 20 feet. A 54-inch pipe-line, more than 1½ miles long, partly in cast-iron and partly in steel, has been laid from the pumping-station which is now being erected in connection with the Walton reservoir; and junctions are being made with two other lines of pipes, 54 and 36 inches diameter respectively, from the Molesey intakes. These connections consist of two 36-inch pipes from the 54-inch, and one 36-inch from the 36-inch. These pipes will be carried to the top of the embankment, where they will discharge into a brick-lined chamber having a sill at the level of the high-water mark of the reservoir. The new 54-inch pipe branches near the base of the embankment into two 36-inch mains, which will also be carried into the chamber referred to; thus making five 36-inch discharge pipes in all. These intake works are well in hand, and will probably be finished throughout during the coming year. The work has been designed by Mr. W. B. Bryan, M.Inst.C.E., the Chief Engineer of the Board.

Early History of the Stretford Gas Undertaking.

Alderman Sir Bosdin Leech, J.P., in a series of articles he has written on "Old Stretford," supplies some interesting facts concerning the early history of the Stretford gas undertaking. Up to 1852, the people of Stretford had to depend for light on "penny dips," sperm candles, or oil-lamps, which were trimmed with antiquated snuffers. In January of that year, a Provisional Committee was appointed to negotiate for the purchase of a suitable plot of land on which to erect gas-works. A site was secured near Langford Bridge, and a Company formed with a modest capital of £2861 10s.; the first Chairman being Mr. George Bannister. In June, 1862, an Act of Incorporation was obtained; the capital being £30,000. Mr. Benjamin Barber was the Company's first Secretary; and on his election to the Board he was succeeded by Mr. James Moore, who retained the position till 1867, when the present Secretary, Mr. Benjamin Haynes, was appointed. About the year 1880, the action of the Directors in voting a bonus to the shareholders instead of applying in reducing the price of gas profits not required for the statutory dividend was challenged, and litigation followed. In the result, the Court held that the Directors had acted wrongly; and the shareholders had to return to the gas funds the money they had received as bonuses. In 1854, the output of gas was 1,752,000 cubic feet; in 1881, it was 36,113,600 cubic feet; and in 1908, the figures were 353,942,000 cubic feet. In 1852, the price of gas was 7s. 6d.; in 1862, 5s.; and now it is 2s. 3d.

Gas Exhibition at Chester.

On Monday last week, a comprehensive exhibition of gas appliances was opened in the Music Hall, Chester. It was initiated by the Directors of the Chester Gas Company, and carried out by the Secretary and General Manager (Mr. F. A. Pye). Messrs. John Wright and Co. had a large display of their specialities, including their patent "Thermo" front gas-fire, and their gas-heated hot-water circulator. Messrs. Fletcher, Russell, and Co., Limited, had an attractive stand, on which were displayed their latest designs in gas fires and cookers and their water-heating appliances. The lighting arrangements of the hall were carried out by the Welsbach Incandescent Gaslight Company, Limited. In the entrance were two Welsbach inverted lamps of 400 and 550 candle power respectively; and the hall was lighted by 600-candle Welsbach-Kern self-intensifying lamps. The Company had a stand at which lamps and fittings in great variety were shown, as well as Kern gas-radiators. An interesting exhibit consisted of two street-lamps, one fitted with a self-intensifying burner giving a light of 300-candle power, with a consumption of 10 cubic feet of gas per hour, and the other containing the No. 3 Kern burner generally employed for public lighting. Among the other exhibitors were Messrs. Sawer and Purves, who showed gas-meter testing apparatus, models of retort-house governors, and gas-fittings of all kinds. On Wednesday, in the presence of the Mayor (Alderman Hewitt), who presided, Mr. J. G. Frost (the Chairman of the Company), Mr. Pye, and Mr. J. C. Belton (the Engineer), Mr. E. Allen, the Engineer of the Liverpool Gas Company, gave an interesting lecture on "Coal Gas." In introducing Mr. Allen, the Mayor said several people had remarked to him that the Corporation ought to own the gas undertaking; but he was not of that way of thinking, because it was far better for the householder that there should be a competitor to the electric light. Mr. Allen then delivered his lecture, and was accorded a vote of thanks, as was also the Mayor for presiding. The exhibition closed on Saturday.

UNBOUNDED SATISFACTION!

More BLAND Light Testimony

St Mary's House,
Ross.
6th Nov 1909

Dear Sirs.

You will be pleased to hear that the 55 "Bland" gas burners fixed in Ross Parish Church 3 years ago - Continue to give more than Satisfaction - The total Gas bill for the past 12 Months amounted to £8. 2. 2 only - with Gas 4/- per 1000.

The upkeep of mantles is very little & I consider The "Bland Light" is the best and most economical Gas burner in the Market.

Yours faithfully
Wm Watkins
Churchwarden
St Mary's Ross.

Gas supplied to Ross Church for Year ending Sept. 30th, 1906, with **naked Burners** £32 18 3

Ditto, Sept. 30th, 1909, with **"BLAND" BURNERS** . **£8 2 2**

BRITISH MANUFACTURE.

THE BLAND LIGHT SYNDICATE, LIMITED,

63, Queen Victoria Street, LONDON, E.C.; and
20, Fennel Street, off Corporation Street, MANCHESTER.

Sales of Stocks and Shares.—There was very keen competition for the new issue of £21,500 of "B" stock of the Southend Gas Company which Messrs. A. & W. Richards made at the Mart, Tokenhouse Yard, last Tuesday, under instructions from the Directors; and it was all sold at from £108 2s. 6d. to £110 per £100. The £3500 of 4 per cent. perpetual debenture stock of the Company, which they offered at the same time, was sold at par. They also placed a new issue of 400 £10 "B" shares of the Tendring Hundred Water Company, ranking for 8 per cent. dividend, and carrying 4½ per cent. from the 1st prox., at £11 2s. 6d. to £11 7s. 6d. per share.

Water Charges at Haverhill.—At the meeting of the Haverhill Urban District Council on Monday last week, the Water-Works, Sanitary, and Sewage Committee reported that they had considered the present charges made for water supplied by the Council, and recommended—"That, the special loan for the water-works having now been paid off, the charge be put back from 1s. 2d. to 1s. in the pound, and that the charge of 1s. 2d. per 1000 gallons be reduced to 1s.; the reductions to come into force for water supplied after Jan. 1, 1910." In moving the adoption of this report, Mr. J. B. Coster explained that about five years ago, when it became necessary to replace one of the old pumping sets at the water-works, the Council contracted a loan for the purpose; and this had now been repaid. At the time the loan was entered into, the price of water was raised from 1s. to 1s. 2d. per 1000 gallons; but the Committee thought that it should now go back to the former figure. The report was adopted.

Ballymena Water Supply.—Last Wednesday, Mr. P. C. Cowan, an Inspector of the Local Government Board for Ireland, attended at the Town Hall, Ballymena, and held an inquiry regarding the Urban District Council's application for a loan of £9000 for the purpose of improving the water supply to the town. The Clerk and Surveyor (Mr. H. O'Hara) said the amount on outstanding loans on water, sewers, gas, abattoir, and fire-engine, was £40,403, which did not include the loan of £1200 for technical purposes. The valuation of the urban district on houses, lands, half annual rents and Government property, was £34,236, and the rateable value of the buildings and land was £34,057. The rate was 5s. 8d. in the pound. The town was supplied by an 8-inch main from the filter-beds; and though this had been scraped several times, it was not adequate, so far as the requirements of the town were concerned, for a proper water supply. Mr. S. Bonnar, the Convener of the Water Committee, said there had existed a great grievance for many years owing to an insufficient supply of water both for domestic and sanitary purposes. There was no opposition to the application; and the Inspector will report in due course.

Creswell Water Supply.—Two schemes have lately been before the Creswell Parish Council for the supply of the parish with water. One was the Welbeck scheme, under which the Duke of Portland would supply the water at 9d. per 1000 gallons, and lay the mains to the reservoir and build it; the parish having to provide the distributing mains. The Bolsover Colliery Company promised the parish the gift of their mains, which would save about £3250. The Duke provided for a minimum supply of not less value than £200 per annum. The other scheme was the Manton; and according to the Engineer's report upon it, the capital charges would be £2335, and the annual charge for water, repayment of loan and interest, maintenance, and wages would amount to £2823 for the district. This would be very favourable, and less than the cost of any scheme that could be carried out now or in the future. It was stated that at the end of the first thirty years the parish would save £8370, and at the end of the second thirty years £20,000. When sanction for the loan had been obtained, the water would be ready in nine months. It was unanimously resolved to support the Manton scheme.

Difficulty Respecting a Gasholder Site.—In connection with the scheme prepared by Mr. J. A. Gray for the extension and improvement of the Ashburton Gas-Works, application is to be made to the Local Government Board for a loan of £2000. At the last meeting of the District Council, a letter was received from the Local Government Board asking if the consent of the owners and occupiers of property within 300 yards of the proposed site of the gasholder had been obtained, as required by the Ashburton Gas Order, 1899. The Board intimated that they would require to be satisfied on this point before they granted their sanction to a loan for the erection of a holder, &c., on other land than under the schedule. It was stated that this had not been done, as the Gas Committee had not had this condition of the Order before them. The Chairman (Mr. J. P. Tucker) said they had been informed by the Clerk that very few people had given their consent to the erection of the holder on the suggested site; and he thought the Committee should consider an alternative scheme. Mr. Lamason, Chairman of the Gas Committee, remarked that the Committee and Mr. Gray considered all alternatives. They were ignorant that the consent of every owner and occupier within 300 yards had to be obtained. It was decided that the Council should consider the opposition to the present scheme before deciding upon an alternative plan.

Water Supply of Exmouth.—The Exmouth Urban District Council held another meeting on Wednesday last with reference to the water scheme. A letter was received from Lord Clinton, the owner of the land, offering to present to the town the fee simple of the land on which the boring has been made at Dotton, with the right to take an unlimited supply of water. The conditions attaching to the gift are that the Council shall provide a supply of water for the farm on which the boring has been made, make good such supplies of water as may be affected by the boring or pumping operations, and supply from their mains any premises or places on his estate for which Lord Clinton may require water, on payment of the same rates as those charged within the Council's district, subject to the proviso that the Council shall not be required to supply water above the level of their reservoir, nor unless there is sufficient water available after the requirements of Exmouth have been furnished. His lordship also offered to grant the necessary easements for pipes in perpetuity at an annual rent of £1. The Chairman (Mr. W. C. Creedy) moved a vote of thanks to Lord Clinton, who, he said, could not have met them on better terms. The Rev. O. J. Reichel, and other opponents of the scheme, declined to support the motion, on the ground that it would commit them to the scheme. The motion was carried by eleven votes to five.

PARKINSON

GAS-HEATED

Steam Radiators

ARE

UNEXCELLED

FOR THE

Efficient and Economical Heating of

CHURCHES, SCHOOLS,
PUBLIC BUILDINGS,
SKATING RINKS,
SHOPS, &c., &c.

EXTRACT FROM LETTER JUST RECEIVED:—

"The Radiators which I fixed in the Wesleyan Chapel and Schools are giving the **greatest satisfaction.** Any inquiries you have refer to me, and I will refer them to the Chapel Committee, from whom they will get the **greatest praise.** They are at present recommending them to the Baptist Church. . . Other Radiators in the town fixed in offices, &c., are **all** giving satisfaction."

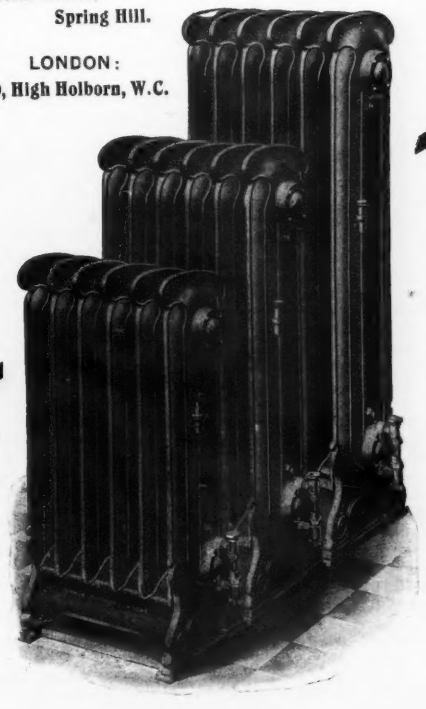
YOUR INQUIRIES WILL BE ESTEEMED.

THE PARKINSON STOVE CO., LTD.

(Incorporating Maughan's Patent Geyser Co.)

BIRMINGHAM:
Stour Street,
Spring Hill.

LONDON:
129, High Holborn, W.C.



Right of a Private Owner to a Water Supply.—At the meeting of the Lostwithiel Town Council last Tuesday, a letter was read from the Local Government Board, asking for the Council's observations upon a letter they had received from Mr. N. B. Littleton, complaining of the Council's action in refusing to take the water-mains to his property at Tanhouse. Upon the same matter a letter was read from Messrs. Sharpe and Co , the Solicitors to the Association of Municipal Corporations, giving the opinion that section 35 of the Water-Works Clauses Act, 1847, does not apply to corporations who supply water under the Public Health Act, and that the owner of premises to which no mains had been laid cannot compel a corporation to furnish him with a supply of water. It was decided to reply to the Local Government Board in the terms embodied in the Solicitors' letter. Mr. Littleton said he had received legal advice as well, and was prepared to go to law on the matter. He considered the Council were getting money from his tenant under false pretences. The Mayor (Mr. H. C. Wheeler) pointed out that the Council were only dealing with the letter from the Local Government Board, and not deciding whether or not Mr. Littleton should have the water.

The Ilfracombe Urban District Council had under consideration at their last meeting the question of treating the streets with tar. Reports were received from other towns, and various schemes were considered, with the result that it was decided to purchase a tar-spraying machine, and to make provision in the estimates for the cost of the work.

At Sunderland, last Tuesday, Thomas Smith and Thomas Wilson were sentenced to eight and six months' imprisonment respectively for obtaining money by false pretences. The prisoners asked for, and received, subscriptions for a dinner which they stated was to be given to the lamplighters in the employ of the South Shields Gas Company. Among those on whom they called was Mr. James Readhead, a county Magistrate, who, doubting their statements, summoned the police and had the men arrested. It was stated that the prisoners had no connection with the Gas Company, and that there was no intention to give the lamplighters a dinner.

Lord Ellesmere is having extensive plant put down at his coke-ovens at the Brackley Collieries, Walkden, Manchester, for the manufacture of motor spirit (benzol) on a large scale. It is claimed that it is cheaper than petrol.

Regarding a paragraph that appeared last week (p. 492), Metropolitan Gas-Meters Limited (Nottingham and London) ask us to announce that their arrangement to sell the "Rapid" light controllers having come to an end, they are placing upon the market another clock controller, which will be known as the "Simplex," of which they are sole licensees and manufacturers.

The Parkinson Stove Company, Limited, of Birmingham, have designed a special floor-stand and a new wall-bracket for use with Maughan geysers. They are supplied in various sizes, and finished either in black enamel or in green porcelain enamel. The wall-bracket can, as a rule, be placed where required without removing the bath, owing to the position of the screws for fixing it to the wall.

Messrs. A. E. Podmore and Co., of No. 34, Charles Street, Hatton Garden, E.C., have issued a new illustrated catalogue of their high-power inverted and upright lamps for outdoor lighting and large interiors, shops, &c. In the wide range shown, something should be found to suit any conceivable requirement in these directions. There are also numerous designs of lamps suitable for factories, workshops, and ordinary domestic purposes, together with adaptors, mantles, and a varied selection of glassware.

The "Hastings and St. Leonards Pictorial Advertiser and Visitors' List" are to be congratulated upon an excellent series of illustrations of the interior and exterior of the Glyne Gap Gas-Works, reproduced from photographs taken by them, which appeared in the issues for the 4th and 11th inst. The pictures, of which there were some dozen in all, were accompanied by an article explaining, in non-technical language, the process of gas manufacture. This peep into the working of a flourishing local industry—indebtedness for which is expressed to the Engineer and Manager (Mr. C. E. Botley) and his Assistant (Mr. C. F. Botley)—should prove of great interest both to the consumers and to the inhabitants generally.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

DRAUGHTSMAN. No. 5155.
DRAUGHTSMAN. W. J. Jenkins and Co.

Situations Wanted.

SECRETARY, MANAGER, AND ACCOUNTANT. No. 5115.
ENGINEER'S ASSISTANT. No. 5151.
HOUSEKEEPER (Daughter of a Gas Engineer). No. 5156.

Plant, &c. (Second-Hand), for Sale.

AIR COMPRESSORS, DRILL CARRIAGES, ROCK DRILLS, AIR PIPES. Sheffield Water Department.

Stocks and Shares.

BRENTFORD GAS COMPANY. Dec. 15.
HARROW AND STANMORE GAS COMPANY. Dec. 7.
LOWESTOFT WATER AND GAS COMPANY. Dec. 7.
MITCHAM AND WIMBLEDON GAS COMPANY. Dec. 6.
SOUTHEND WATER COMPANY. Dec. 7.

TENDERS FOR

Fire-Clay Goods.

LEEK GAS DEPARTMENT. Tenders by Dec. 4.

Pipes.

PONTYPOOL GAS AND WATER COMPANY. Tenders by Dec. 3.

Sulphate of Ammonia.

DEAL AND WALMER GAS COMPANY. Tenders by Nov. 30.

Sulphur (Recovered). No. 5154.

Sulphuric Acid.

SALFORD GAS DEPARTMENT. Tenders by Dec. 2.

Tar and Liquor.

GAINSBOROUGH GAS DEPARTMENT. Tenders by Nov. 30
SHOTLEY BRIDGE AND CONSETT GAS COMPANY. Tenders by Dec. 9.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 521.

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Oct. 14	10	Alliance & Dublin 10 p.c.	17–18	..	5 11 1
298,955	10	,,	7	Do. 7 p.c.	12½–13	..	5 7 8
310,000	Stk.	July 14	4	Do. 4 p.c. Deb.	98–100	..	4 0 0
200,000	5	Oct. 28	6½	Bombay, Ltd.. . . .	5⅝–6	..	5 8 4
40,000	5	,,	6½	Do. New, £4 paid .	4½–4⅝	..	5 9 1
50,000	10	Aug. 26	15	Bourne- mouth Gas and Water — 10 p.c. . . B 7 p.c. . Pref. 6 p.c.	28–28½	..	5 5 3
311,810	10	,,	7		16½–16⅝	..	4 3 7
75,000	10	,,	6		15½–15⅝	..	3 16 2
380,000	Stk.	Aug. 12	12½	Brentford Consolidated	253–256	–1	4 17 8
300,000	,,	,,	9⅜	Do. New . . .	190–192	..	4 19 0
50,000	,,	,,	5	Do. 5 p.c. Pref. .	120–122	..	4 2 0
206,250	,,	June 11	4	Do. 4 p.c. Deb. .	100–102	..	3 18 5
220,000	Stk.	Sep. 10	11	Brighton & Hove Orig.	208–213	..	5 3 3
246,320	,,	,,	8	Do. A Ord. Stk. .	150–152	..	5 5 3
460,000	20	Oct. 14	10	British	42–43	..	4 13 0
109,000	Stk.	Aug. 26	6	Bromley, A 5 p.c. . .	118–120	..	5 0 0
165,700	,,	,,	4½	Do. B 3½ p.c. . .	88–90	..	5 0 0
82,278	,,	,,	5⅜	Do. C 5 p.c. . .	106–108	..	5 1 10
55,000	,,	June 25	3½	Do. 3½ p.c. Deb. .	88–90	..	3 17 9
500,000	10	Oct. 14	7	Buenos Ayres (New) Ltd.	13½–14	..	5 0 0
250,000	Stk.	June 25	4	Do. 4 p.c. Deb. .	96–98	..	4 1 8
100,000	10	—	—	Cape Town & Dis., Ltd.	2½–3½	–1½	—
100,000	10	—	—	Do. 4½ p.c. Pref. .	5⅝–5⅞	..	—
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	478–485	..	6 3 9
100,000	Stk.	June 25	4½	Do. 4½ p.c. Deb. Stk.	82–84	..	5 7 2
157 150	Stk.	Aug. 12	5⅝	Chester 5 p.c. Ord. . .	108¾–110½	..	4 10 6
1,493,280	Stk.	Aug 26	5⅛	Commercial 4 p.c. Stk. .	109 –111	..	4 13 8
560,000	,,	,,	5	Do. 3½ p.c. do. .	104–105	..	4 14 4
475,000	,,	June 11	3	Do. 3 p.c. Deb. Stk.	81–83	..	3 12 3
800 000	Stk.	,,	5	Continental Union, Ltd.	97–99	..	5 1 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	138–140	..	5 0 0
493,270	Stk.	—	5	Derby Con. Stk. . . .	121–123	..	4 1 4
55.000	,,	—	4	Do. Deb. Stk. . . .	103–105	..	3 16 2
143,995	,,	Oct. 2	5	East Hull 5 p.c. Ord. .	97–99	..	5 1 0
486,090	10	July 14	12	European, Ltd. . . .	24½–25	..	4 16 0
354,060	10		12	Do. £7 10s. paid.	8½–9	..	4 14 9
15,141,545	Stk.	Aug. 12	4⅜	Gas light and Coke — 4 p.c. Ord. . . 3½ p.c. max. . . 4 p.c. Con. Pref. 3 p.c. Con. Deb.	102 –104	..	4 9 8
2,630,000	,,	,,	3½		87–89	..	3 18 8
3,793,735	,,		4		103 –105	..	3 16 2
4,193,975	,,	June 11	3		£2–5⅛	..	3 11 5
258,740	Stk.	Sep. 10	5	Hastings & St. L. 3½ p.c.	92–94	..	5 6 4
82,500	,,	,,	6½	Do. do. 5 p.c	117–119	..	5 9 3
70,000	10	Sep. 29	11	Hongkong & China, Ltd.	17½–17⅝	..	6 4 0
131,000	Stk.	Sep. 10	6½	Ilford A and C . . .	144 –146	..	4 9 0
65,783	,,	,,	5	Do. B	108–110	..	4 10 11
65,500	,,	June 25	4	Do. 4 p.c. Deb. . .	102 –104	..	3 16 11
4,940,000	Stk.	Nov. 11	8	Imperial Continental	176–178*	..	4 9 11
1,235,000	Stk.	Aug. 12	3½	Do. 3½ p.c. Deb. Red.	95–97	..	3 12 2

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
195,242	Stk.	Aug. 26	6	Lea Bridge Ord. 5 p.c. .	119–121	..	4 19 2
561,000	Stk.	,,	10	Liverpool United A .	223–225	..	4 8 11
718,100	,,	,,	7	Do. B . .	166–168	..	4 3 4
306 083	,,	June 25	4	Do. Deb. Stk.	104–106	..	3 15 6
75,000	5	June 11	6	Malta & Mediterranean.	4⅛–5⅛	..	5 17 1
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	59–102	..	4 18 0
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	100–102	..	4 8 3
541,920	20	Nov. 11	3½	Monte Video, Ltd. . .	12⅛–13⅜	..	5 7 8
1,775,892	Stk.	July 29	4½	Newc'tle & G'tesh'd Con	106–108	..	4 3 4
518,795	Stk.	June 25	3½	Do. 3½ p.c. Deb.	93–94	..	3 14 6
55,940	10	Aug. 26	7	North Middlesex 7 p.c.	13–13½	..	5 3 8
300,000	Stk.	Apl. 29	8	Oriental, Ltd. . . .	140–142	..	5 12 8
60,000	5	Sep. 10	8	Ottoman, Ltd. . . .	6⅛–6⅜	..	6 5 6
31,800	53	Aug. 26	13	Portsea Island A. . .	137–139	..	4 19 0
60,000	50	,,	13	Do. B. . .	129–131	..	4 19 3
100,000	50	,,	12	Do. C. . .	120–123	..	4 17 7
114,800	50	,,	10	Do. D and E.	101–103	..	4 17 1
398,490	5	Oct. 28	7	Primitiva Ord. . . .	7–7⅛	..	4 16 7
796,982	5	July 29	5	Do. 5 p.c Pref. .	5⅛–5⅜	..	4 10 11
488,902	100	June 1	4	Do. 4 p.c. Deb. .	95–97	..	4 2 6
1, 00,000	10	Oct. 14	8	River Plate Ord. . .	16½–16⅝	..	4 15 7
312,650	Stk.	June 25	4	Do. 4 p.c. Deb. .	96–98	..	4 1 8
250,000	10	Sep. 29	8	San Paulo, Ltd. . . .	14½–15	+½	5 6 8
62,500	10	,,	6	Do. 6 p.c. Pref. .	11⅝–12¼	..	4 18 0
125,000	50	July 1	5	Do. 5 p.c. Deb. .	51–52	..	4 16 2
135,000	Stk.	Sep. 10	10	Sheffield A	230–232	..	4 6 2
219,981	,,	,,	10	Do. B	230–232	..	4 6 2
523,500	,,	,,	10	Do. C	230–232	..	4 6 2
70,000	10	Oct. 14	10	South African	12½–12¾	..	7 16 11
6,429,895	Stk.	Aug. 12	5⅜	South Met., 4 p.c. Ord.	120–122	..	4 7 4
1,895,445	,,	July 14	3	Do. 3 p.c. Deb.	82–84	..	3 11 5
209,82	Stk.	Aug. 26	8	South Shields Con. Stk.	156–158	+2	5 1 3
605,003	Stk.	Aug. 12	5½	S'th Suburb'n Ord. 5 p.c.	119–121	..	4 10 11
60,000	,,	,,	5	Do. 5 p.c. Pref. .	120–122	..	4 2 0
117,038	,,	July 14	5	Do. 5 p.c. Deb. Stk.	122–124	..	4 0 8
502,310	Stk.	Nov. 11	5	Southampton Ord. . .	109–111*	..	4 10 1
120,000	Stk.	Aug. 12	6⅞	Tottenham A 5 p.c. .	131–135	..	5 1 9
453,940	,,	,,	5⅜	and B 3½ p.c. .	111–113	..	4 15 3
149,470	,,	June 25	4	Edmonton 4 p.c. Deb.	100–102	..	3 18 5
182,380	10	June 11	8	Tuscan, Ltd. . . .	9–9½	..	8 8 6
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	101–102	..	4 18 0
236,476	Stk.	Aug. 14	5	Tynemouth, 5 p.c. max.	110–112	..	4 9 3
255,6 6	Stk.	Aug. 26	6⅞	Wands- worth B 3½ p.c. .	139–141	..	4 14 0
79,416	,,	June 25	3	and 3 p.c. Deb. Stk.	73–75	..	4 0 0
895,872	,,	Aug. 12	5⅜	West Ham 5 p.c. Ord. .	123–125	..	4 6 0
210,000	,,	,,	5	Do. 5 p.c. Pref. . .	126–128	..	3 18 2
253,300	,,	June 25	4	Do. 4 p.c. Deb Stk..	108–110	..	3 12 9

Prices marked * are "Ex div."

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"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

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Offices: City Chambers, LEEDS.
Correspondence invited.

LUX'S GAS PURIFYING MASS.
See Advertisement on p. 505.
FRIEDRICH LUX, LUDWIGSHAFEN-AM-RHEIN.

TAR WANTED.
National Telephone 7002. Telegrams: "UPRIGHT."
Apply, THOMAS HORROCKS
Albert Chemical Works, BRADFORD,
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Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Sulphate of Ammonia.

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

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For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
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It is also used for the enrichment of Gas.
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Telegrams: "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.

GAS OILS.
MEADE-KING, ROBINSON, & CO.
Represent the Strongest Independent Refineries in America; also Petroleum Spirit for Gas Enrichment. 18, EXCHANGE STREET, MANCHESTER, and 11, OLD HALL STREET, LIVERPOOL.

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Telegrams: "CHEMICALS, OLDBURY."

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GAS APPARATUS MANUFACTURER AND CONTRACTOR.
Telegrams: "GASOSO LONDON." Telephone: 14 HAMMERSMITH.

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CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.
Telegrams: "CHEMICALS."

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FOR REALLY RELIABLE
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THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, Nov. 2, p. 357.

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FINEST DUTCH BOG-ORE.
(Natural Oxide of Iron.)
Best Percentages. For lowest Quotations to any Port, Station, or direct into Works, please apply to—
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"FORTO" Incandescent Gas Mantles Combine Brilliancy and Strength. British Made. Send for List.
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We guarantee promptness, with efficiency for Repairs.
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Telegrams: SATURATORS, BOLTON. Telephone 0643.

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The one Machine which Discharges and Charges at One Stroke.
See Advertisement, Nov. 9, p. III. of Centre.
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Firth Blakeley, Sons, and Company, Limited, Thornhill, Dewsbury.

APPLICATIONS for Appointments arranged effectively. Greatly appreciated by Recipients. Numerous unsolicited Testimonials. Write Now for Particulars.
Herbert Greatorex, Upper Hackney, Matlock.

MR. W. B. MIMMACK, for many years Secretary, Manager, and Accountant of the Crays Gas Company (111 Millions), now in Amalgamation, seeks APPOINTMENT in any or all of these Offices.
Address No. 5115, care of Mr. King, 11, Bolt Court, Fleet Street E.C.

YOUNG Lady, daughter of a Gas Engineer, is desirous of meeting with a Situation as HOUSEKEEPER or any Position of Trust in a Family.
Address No. 5156, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

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YOUNG man just completed Indenture at a large Provincial Gas-Works desires Position as ASSISTANT. Good Draughtsman and Chemist. Highest References.
Address No. 5151, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, immediately, in London, an Experienced DRAUGHTSMAN used to preparing Plans and Estimates for Coal-Handling Plant. One who has served in the Shops Preferred.
Apply, stating Salary required, with Details of Experience, to No. 5155, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

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Apply, stating Age, Experience, and Wages required, to W. J. Jenkins and Company, Limited, Engineers, Retford.

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State Quantity available and percentage, with Lowest Price on Rails, to No. 5154, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

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About 7000 Yards of SHEET-IRON AIR PIPES, 20 inches diameter, 9 feet long, 16 W.G. Thick.
Offers invited.
For further Particulars, Apply to the General Manager, Sheffield Corporation Water-Works, Town Hall, Sheffield.
Nov. 11, 1909.

DEAL AND WALMER GAS COMPANY.

THE Directors invite Tenders for the Purchase of about 20 Tons of SULPHATE OF AMMONIA, delivered f.o.r. Deal Station, in Purchasers' Bags.
The Purchaser to take delivery previous to the 31st of December 1909.
Sample will be sent on Application.
Tenders to be sent in not later than Tuesday, the 30th inst., addressed to the Chairman, Gas Offices, Cannon Street, Deal.
The Directors do not bind themselves to accept the highest or any Tender.
Gas Offices, Deal,
Nov. 17, 1909.

SHOTLEY BRIDGE AND CONSETT DISTRICT GAS COMPANY.

TENDERS FOR TAR.

THE Directors of this Company invite TENDERS for the Purchase of the TAR produced at their Works from the 1st of January to the 31st of December, 1910. Quantity about 80,000 Gallons. Contractor to find his own Casks, and to accept Delivery at Blackhill Station.
Tenders to be sent to the undersigned, not later than Thursday, Dec. 9, 1909.
M. Richley,
Secretary.
Gas Offices, Front Street,
Shotley Bridge.

LEEK URBAN DISTRICT COUNCIL.
(Gas Department.)

FIRE-CLAY GOODS.

THE Gas Committee invite Tenders for the Supply of FIRE-CLAY GOODS for the Year 1910.
Specification and Form of Tender and all Particulars may be obtained from the undersigned.
Tenders, endorsed "Fire-Clay Goods," and addressed to the Chairman of the Gas Committee, Town Hall, Leek, to be delivered by the 4th of December, 1909.
The Committee do not bind themselves to accept the lowest or any Tender.
S. Trow Smith,
Engineer and Manager.
Gas-Works, Leek,
Nov. 17, 1909.

GAINSBOROUGH URBAN DISTRICT COUNCIL.
(Gas Department.)

TENDERS FOR AMMONIACAL LIQUOR.

THE Gas Committee of the above Council are prepared to receive TENDERS for the Purchase of the AMMONIACAL LIQUOR produced at their Gas-Works for a period of Twelve Months from the 1st of January, 1910.
Further Particulars may be obtained on Application to the undersigned.
Sealed and endorsed Tenders, addressed to the Chairman of the Gas Committee, must be delivered at the Gas-Works, Gainsborough, not later than Tuesday, Nov. 30, 1909.
The Committee do not bind themselves to accept the highest or any Tender.
John Baldwin,
Manager.
Gas-Works, Gainsborough,
Nov. 20, 1909.

BRENTFORD GAS COMPANY.

SALE BY TENDER OF £30,000 NEW STOCK, 1881.

IN pursuance of the Brentford Gas Order, 1881, Notice is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER £30,000 of NEW STOCK, 1881, of the Company, to be paid up in full on or before the 15th day of January, 1910; such Stock being a portion of Additional Capital Authorized to be raised by Resolutions passed at an Ordinary Meeting of the Proprietors held on the 11th day of February, 1898, under the powers of the above-mentioned Order.
Particulars and Conditions of Tender may be obtained on Application at this Office; and Sealed Tenders must be sent in not later than Ten o'clock on the Morning of Wednesday, the 15th day of December next.
By order,
William Mann,
Secretary.
Office: Brentford Gas Company,
Brentford, Nov. 1, 1909.

Issued under the powers and subject to the provisions of "The Mitcham and Wimbledon Gas Act, 1907."

MITCHAM AND WIMBLEDON DISTRICT GASLIGHT COMPANY.

NOTICE OF SALE BY TENDER OF £12,000 CONSOLIDATED ORDINARY STOCK.

Minimum Price of Issue £108 per £100 of Stock.

THE Directors of the Mitcham and Wimbledon District Gaslight Company Hereby Give Notice that they will be prepared to receive, not later than Five o'clock p.m. on Monday, the 6th day of December, 1909, Sealed Tenders for £12,000 CONSOLIDATED ORDINARY STOCK of the Company, in lots of the nominal amount of £50, or Multiples thereof.
No Tender for any less nominal amount than £50, or at a less price than £108 per £100 of Stock, will be entertained.
The Balance of the Purchase Money is to be paid on or before Monday, the 3rd day of January, 1910. Dividend will accrue from the 1st day of January, 1910.
Tenders must be made on Forms provided by the Company, which, with Particulars and Conditions of Sale, can be obtained on Application to the undersigned.
Benjamin Green,
Secretary.
Offices and Works, Western Road,
Mitcham, Surrey.

COUNTY BOROUGH OF SALFORD
(Gas Department.)

THE Gas Committee invite Tenders for the Supply of about 1800 Tons of SULPHURIC ACID, to be delivered during the Year 1910.
Full Particulars may be obtained on Application to Mr. William W. Woodward, Engineer, Gas Offices, Bloom Street, Salford.
Sealed Tenders, endorsed "Tender for Acid," to be delivered to me not later than Three p.m. on Thursday, the 2nd of December, 1909.
L. C. Evans,
Town Clerk.

PONTYPOOL WATER-WORKS.
Contract No. 5.

THE Directors of the Pontypool Gas and Water Company are desirous to receive TENDERS for the Laying of about Two Miles of CAST-IRON SOCKET PIPES (chiefly 10 inches in Diameter).
The Drawings and Specification may be inspected, and Form of Tender may be obtained (on payment of Two Guineas, returnable if a *bonâ-fide* Tender be made) on Application at the Office of the Company at Pontypool, or at the Office of Messrs. T. & C. Hawksley, Civil Engineers, Caxton House (West Block), Westminster, S.W., on and after Friday, the 19th day of November instant, and Tenders must be delivered at the Office of the Company, Clarence Street, Pontypool, at or before Twelve o'clock noon on Friday, the 3rd day of December, 1909.
The Company do not pledge themselves to accept the lowest or other Tender.
(Signed) T. B. Pearson,
Secretary.
Pontypool, November, 1909.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.
Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to Messrs. A. & W. Richards, at 18, Finsbury Circus, E.C.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF 500 NEW ORDINARY FIVE PER CENT. MAXIMUM £10 SHARES
AND
£5000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Dec. 7, at Two o'clock, in Lots.
Particulars of the Auctioneers, 18, Finsbury Circus, E.C.

By order of the Directors of the
HARROW AND STANMORE GAS COMPANY.

NEW ISSUE OF 500 £10 "C" SHARES.

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LOWESTOFT WATER AND GAS COMPANY.

45 £10 ORDINARY TEN PER CENT. SHARES
AND
47 £10 ADDITIONAL ORDINARY SEVEN PER CENT. SHARES.

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THE SECOND EDITION OF
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BOOK-KEEPING.
A Practical Treatise on the Keeping of Gas Companies' Accounts.
By
JOHN HENRY BREARLEY, and
BENJAMIN TAYLOR.

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Highest Results in Gas, & Excellent Coke.

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Manufacture and keep in Stock at their Works (also large Stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

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BOYS CALORIMETERS
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Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

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Special Pressure and Pressure & Exhaust Registers.

For RETORT-HOUSE GOVERNORS.
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For OFFICES AND DISTRICTS.

Fullest particulars on application to—
T. G. MARSH,
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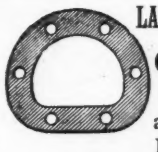

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Telegraphic Address: "MACHINE, LOWER GORNAL."
SPECIAL BRICKS & BLOCKS of every description for GENERATOR and REGENERATOR FURNACES.
Large Stocks of Bricks of all sizes, Burrs, Boiler Seating Blocks and Covers, Plain and Rebated Tiles, &c., &c.
"ABC" Code and UNICODE used for Telegrams and Cablegrams.

Retorts and other Fire-Clay Goods carefully packed for export.

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GEO. R. LOVE'S
INCLINES AT 45 DEGREES.

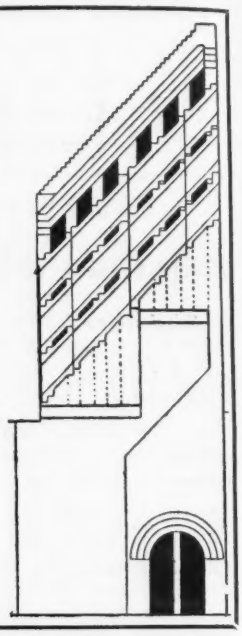
CARBONIZATION MADE EASY.

A Few Recommendations for this System:—

Simplicity of Design.
No **Machinery** to get out of order.
Carbonizing charges **40 per cent. less** than with Horizontals.
No skilled Stokers necessary.
Yield of Gas per ton guaranteed about 1000 cubic feet more than under present conditions, of guaranteed candle power.

Heats under absolute control throughout the whole length of the Retorts.
Saleable value of Coke greatly increased.
25 per cent. greater yield of Ammonia.
More liquid Tar.
Stopped Pipes unknown.

Naphthalene always in solution.
45 per cent. less ground space required.
Constructional cost per Ton carbonized considerably less than with Horizontal or Ordinary Inclined Retorts.
Several Installations in course of construction or completed.



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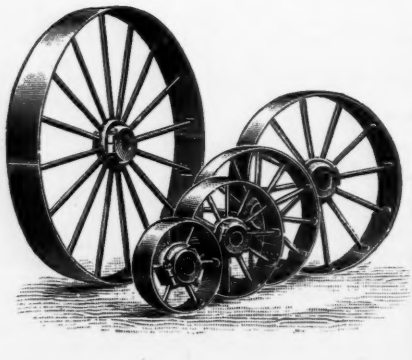

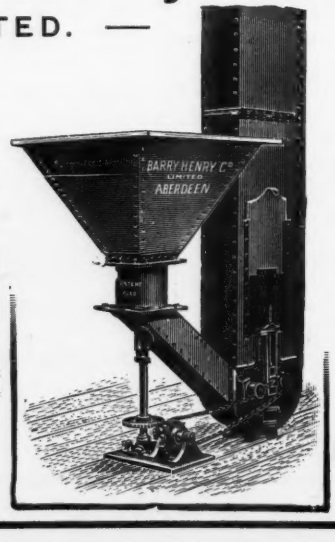

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AND
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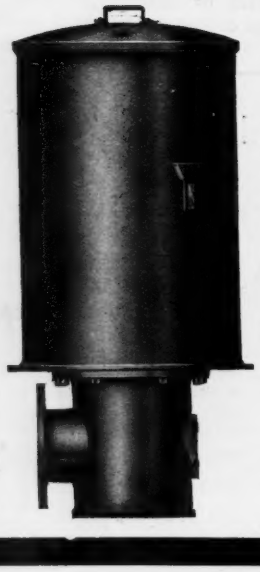

RETORT HOUSE GOVERNORS.

THESE Governors are made to prevent fluctuation in the Pressure of Exhaust in the Hydraulic Main by controlling the Gas entering the Governor, notwithstanding the constant varying quantity of Gas coming from the Retorts. This enables the Seal of the Dip Pipes to be reduced to a minimum with perfect safety, and an increase in the make of Gas per Ton of Coal is thereby assured.

There is absolutely no possibility of any sticking, due to deposits of Tar or Pitch, with this Governor, as the Cone is quite free to pass through the Seat. The Regulation by means of a long Parabolic Cone is recognized as the most exact method that can be employed. A great improvement, first introduced by Messrs. JAMES MILNE & SON, LIMITED, is the simple arrangement by which a smaller Cone and Seat can be easily fitted, thus ensuring delicate adjustment during a period of small makes.

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GRAETZIN LIGHT

Important Improvements.

BURNERS.

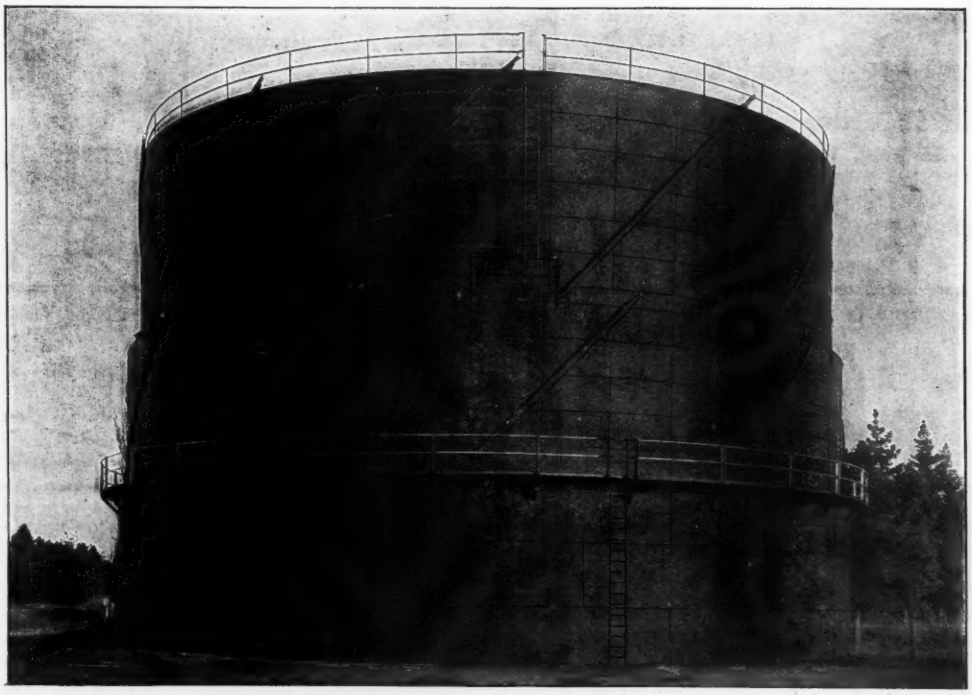
1. **20-Candle Power more light** without increase in the consumption of gas.
2. **Patent Gas Adjuster;** cannot get out of order.
3. **Automatic Gas Regulator,** ensures a constant and unvarying pressure of 35 mm., guarantees a steady light, at the same time obviating waste of gas and blackening of the burner.
4. **Accurate Regulation of the Air Supply.**
5. Burners will be supplied either with Gas Adjuster or Automatic Gas Regulator.
6. The brass casing is heatproof, and, if occasionally cleaned with warm water, will not become discoloured.

LAMPS.

From Lamps with more than one burner, the injectors can be removed from the outside, without taking the lamps to pieces.

CLAYTON, SON & CO., LTD., HUNSLET, LEEDS.

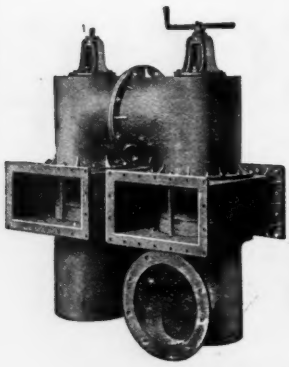
Makers of the First Spiral Guided Holder (1889).

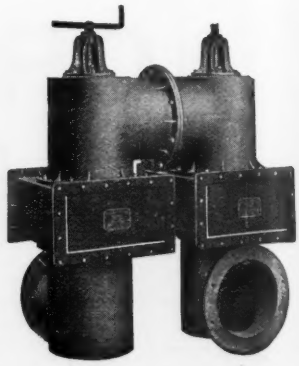


Two-Lift Spiral Guided Gasholder (Clayton and Pickering's Patent Guides) with Steel Tank, capacity 150,500 cubic feet, just completed for the Napier Gas Company, Limited, New Zealand, and erected at their Hastings Works, N.Z.

MILBOURNE'S PATENT

Purifier Valves





fixed inside or outside the Purifiers.

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MIDLAND IRON-WORKS, DONNINGTON, SALOP.

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All Orders entrusted to

MOBBERLEY & PERRY OF STOURBRIDGE LIMITED,

either for Gas Retorts, and every description of Stourbridge Fire-Clay Goods, are executed promptly and best quality supplied.

Specially trained Staff kept for the manufacture of Taper Inclined Retorts.

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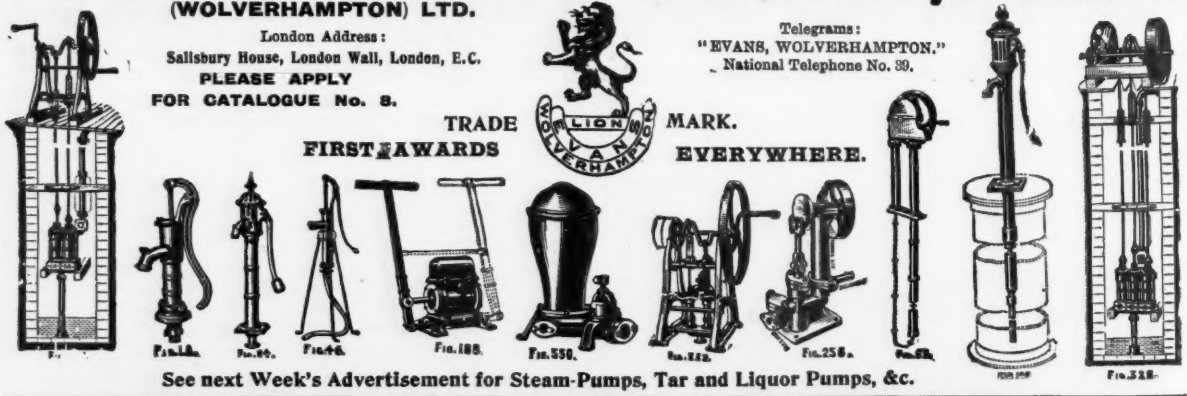

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CAST-IRON PIPES FOR GAS, WATER, & STEAM,

also VALVES of all descriptions.

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ALLIANCE FOUNDRY, 147, MILTON STREET, GLASGOW,
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Are the exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, Wigan, and of the Manton Steam and House Coal Collieries, Worksop, Notts, and supply the well-known Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, House and Steam Coals, &c.

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for WATERWORKS *Etc.*

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CONTRACTORS TO THE CHIEF GASWORKS IN THE BRITISH ISLES AND ABROAD.
FOR
MANUFACTURED FROM OUR CAREFULLY SELECTED AND WELL SEASONED STOCK OF OLD MINE FIRE CLAY.
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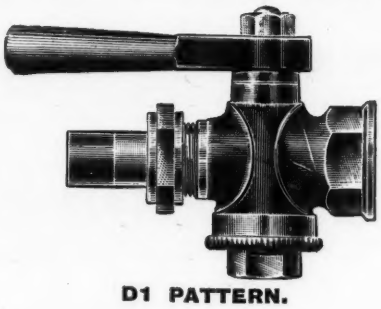
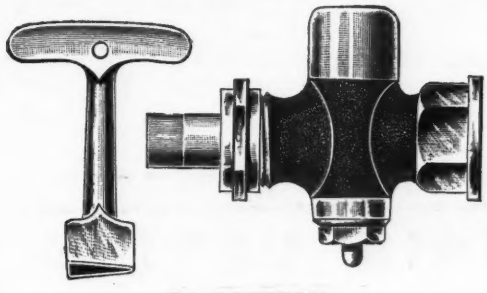
GAS ENGINEERS.

FULL-WAY GUN-METAL GAS-MAIN COCKS A SPECIALITY.



D1 PATTERN.



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Brass Gas-Fittings, Wrought-Iron Gas and Steam Tubes, Coke Forks and Shovels always in Stock. Coke Barrows, Tools of all Descriptions.

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TAR-FOG EXTRACTOR

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Chamber-Furnaces

HORIZONTAL, VERTICAL, INCLINED

FOR GAS AND COKE

SO FAR 97 CHAMBERS BUILT AND BUILDING FOR A DAILY PRODUCTION OF

4 322 500 C.Feet.

IN POINT OF EFFICIENCY, COST OF PRODUCTION AND RESULTS

BEST FURNACES IN THE WORLD.

2000 WORKMEN.

ENQUIRIES AT ONCE ATTENDED TO.

MAIN LAYING.

Paper by PERCY GRIFFITH, M.Inst.C.E., and BRUCE McGREGOR GRAY, Assoc.M.Inst.C.E., before the Association of Water Engineers.

A. The Authors used *Flanged Pipes* for the Rising Main up the Steep side of the Barff, and their experience proved that this was not an advantage, as *the rigidity of the Joints involved considerable difficulty* in regard to the depth of the Trench, and a good deal of Cutting to make the final Connections at each end of the Pipe-Line.

B. In the case of the Delivery Main, the Joints were *Ordinary Socket Joints*, but made with Lead only. The only difficulty met with here was the necessity for *pouring the Lead in* at a suitable temperature *to prevent it melting the Solid Lead Fillet*, and *running through into the Pipe.*

C. In some of the Smaller Branch Connections, Lead Wool was used, and proved highly successful.

Particulars from

THE LEAD WOOL CO., LTD., SNODLAND, KENT.

THE

"DARWIN"

PATENT

INVERTED BURNERS.

No. 3 "DARWIN." 3½in. Fitting.

Have been remodelled, and we now offer you

BETTER BURNERS

AT

REDUCED PRICES

And guarantee the highest finish and Workmanship.

Independent Test by a well-known Gas Manager of No. 3 Burner.

CONSUMPTION . . . 3·55 ft.
of Gas at 15/10ths Pressure,

CANDLE POWER . . . 122·76

These figures speak for themselves.

Breakage of Mantles and

MAINTENANCE CHARGES

Reduced to a minimum.

Made in 3 SIZES and 8 PATTERNS

BY

CHARLES JOYNER & CO., LIMITED,

Icknield Square,

BIRMINGHAM.

Welsbach
LIGHT
Inverted Arc Lamp, Fig. 623.

Storm Proof—
For Exterior Lighting.

Welsbach-Kern
(Patent) Inverted System

BRITISH MADE.

BRITISH MADE.

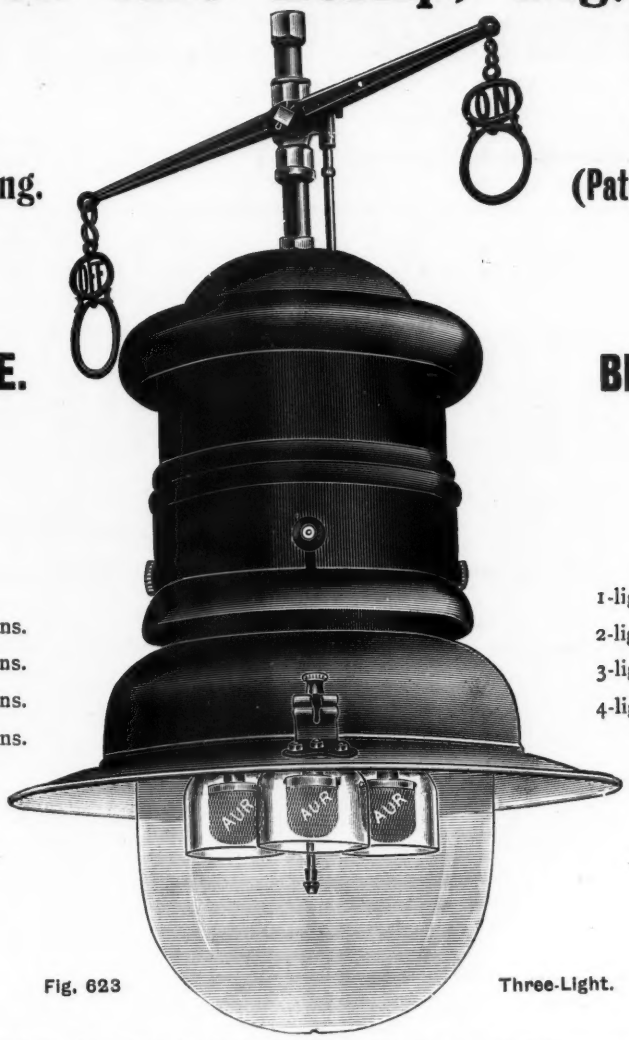

Fig. 623 Three-Light.

Height over all.

1-light . . .	1 ft. 8 ins.
2-light . . .	2 ft. 4 ins.
3-light . . .	2 ft. 4 ins.
4-light . . .	2 ft. 7 ins.

Width over all.

1-light . . .	1 ft. 1 in.
2-light . . .	1 ft. 5 ins.
3-light . . .	1 ft. 5 ins.
4-light . . .	1 ft. 8 ins.

ENAMELLED Green Steel Casing, fitted with Welsbach-Kern Inverted Burners, Gas and Air Regulators operated from outside. Sliding Door to give access to Burners for cleaning purposes. Fitted with Magnesia Nozzles, Welsbach Mantles, and Glass Mantle Protectors. Complete as shown. Highly efficient and regenerative.

	Gas per hour.	*C.P.*	*Steel.*	*Copper Case.*		*Gas per hour.*	*C.P.*	*Steel.*	*Copper Case.*
1-light	4 feet	125	**30/-**	**5/-** extra.	3-light	12 feet	400	**52/6**	**6/-** extra.
2-light	8 feet	260	**47/6**	**6/-** extra.	4-light	16 feet	550	**72/6**	**9/-** extra.

All on or off, or One light on and the rest off, **7/6** per Lamp extra. Cup and Ball, **3/6** per Lamp extra.

RENEWALS.

Glass Mantle Protectors (Fig. 623) **3/4½** per dozen, or in case lots of 5 gross, **33/-** per gross.

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Clear Glass Globes, each	**2/3**	**5/9**	**5/9**	**9/-**
" " " In Case lots per dozen.	**19/6**	**57/9**	**57/9**	**93/-**
Case contains . .	*80*	*18*	*18*	*12*

		1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Wired Globes, extra	each	**2/-**	**2/-**	**2/9**	**3/6**
Parabolic Reflector, extra	"	**3/6**	**6/-**	**7/6**	Not made

Welsbach Mantles, each **6d.** subject as usual.

The Welsbach Mantles for Upright lighting are "C," "CX," and "Plaissetty," price **4½d.** each.

THE WELSBACH INCANDESCENT GAS LIGHT CO., LTD..

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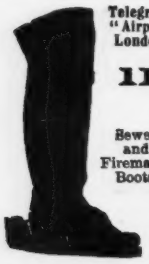
Telegrams and Cables: "WELSBACH LONDON." *Telephone 2410 NORTH.*



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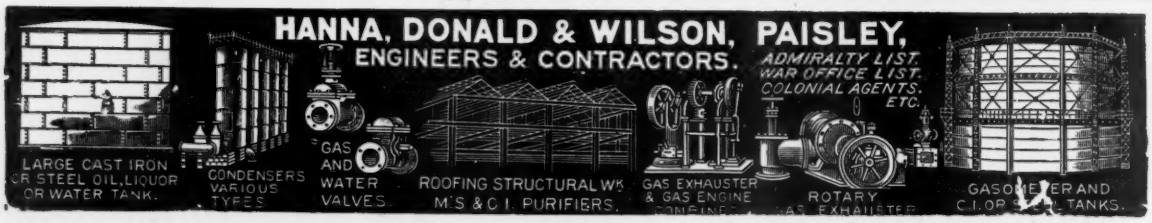

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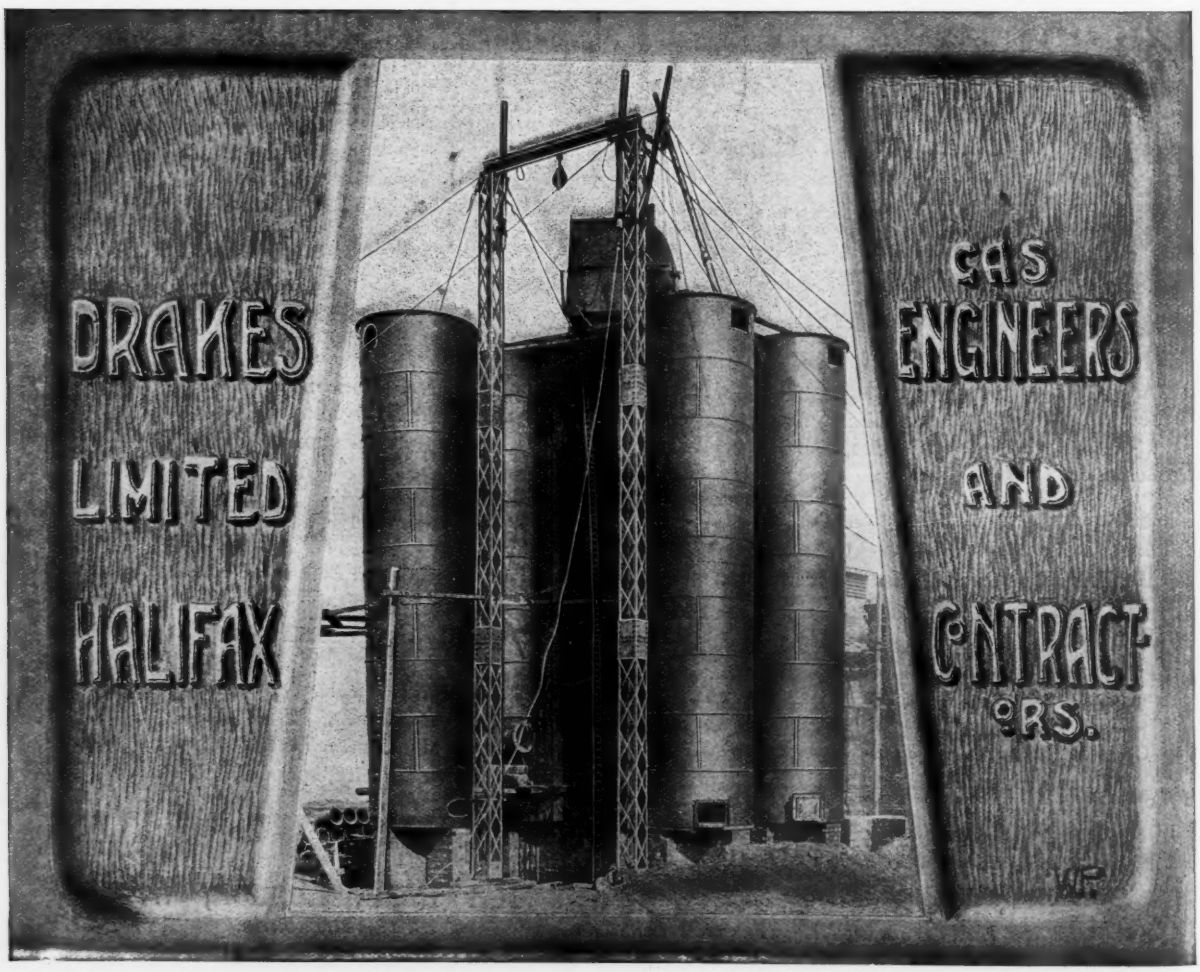

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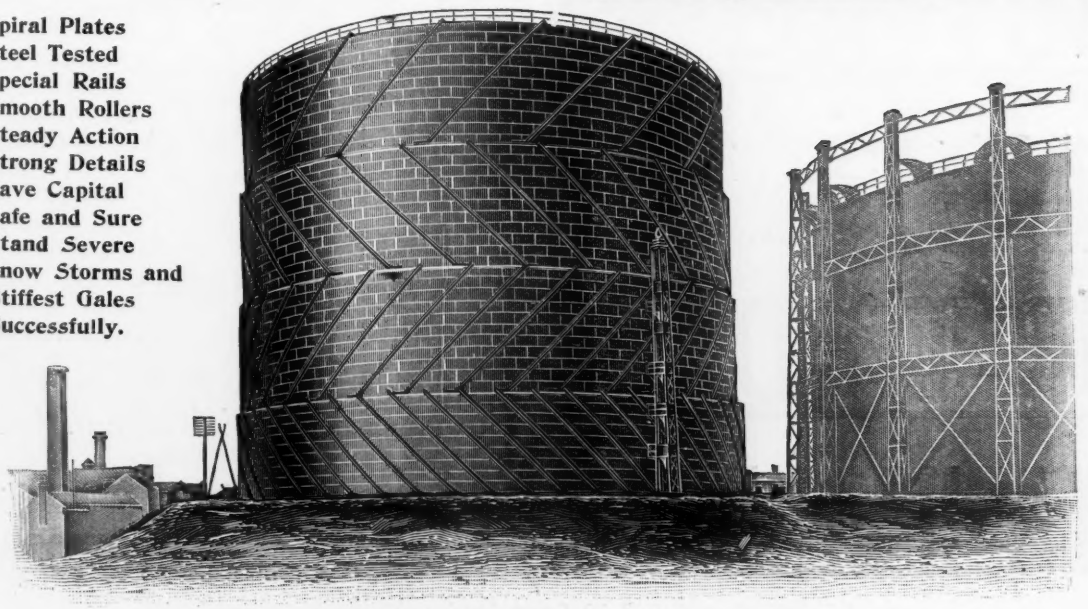

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